DRAFT

Omnibus Essential Fish Habitat Amendment 2
Volume 4: Cumulative effects, compliance with applicable law and references

Amendment 14 to the Northeast Multispecies FMP
Amendment 14 to the Atlantic Sea Scallop FMP
Amendment 4 to the Monkfish FMP
Amendment 3 to the Atlantic Herring FMP
Amendment 2 to the Red Crab FMP
Amendment 2 to the Skate FMP
Amendment 3 to the Atlantic Salmon FMP

Including a

Draft Environmental Impact Statement

Prepared by the
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In cooperation with the
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2 Practicability Analysis

The Essential Fish Habitat regulations refer to a practicability standard in regards to the feasibility of implementing particular measures to minimize the adverse effects of fishing on EFH. From 50 CFR §600.815(a)(2)(iii):

> "In determining whether it is practicable to minimize an adverse effect from fishing, Councils should consider the nature and extent of the adverse effect on EFH and the long and short-term costs and benefits of potential management measures to EFH, associated fisheries, and the nation, consistent with National Standard 7 [Costs and Benefits]. In determining whether management measures are practicable, Councils are not required to perform a formal cost/benefit analysis."

The National Standard 7 analytical guidance discusses what criteria should be considered in cost/benefit analysis. From 50 CFR §600.340(d):

> "The supporting analyses for FMPs should demonstrate that the benefits of fishery regulation are real and substantial relative to the added research, administrative, and enforcement costs, as well as costs to the industry of compliance. In determining the benefits and costs of management measures, each management strategy considered and its impacts on different user groups in the fishery should be evaluated. This requirement need not produce an elaborate, formalistic cost/benefit analysis. Rather, an evaluation of effects and costs, especially of differences among workable alternatives, including the status quo, is adequate. If quantitative estimates are not possible, qualitative estimates will suffice.
>
> Management measures should be designed to give fishermen the greatest possible freedom of action in conducting business and pursuing recreational opportunities that are consistent with ensuring wise use of the resources and reducing conflict in the fishery. The type and level of burden placed on user groups by the regulations need to be identified. Such an examination should include, for example: Capital outlays; operating and maintenance costs; reporting costs; administrative, enforcement, and information costs; and prices to consumers. Management measures may shift costs from one level of government to another, from one part of the private sector to another, or from the government to the private sector. Redistribution of costs through regulations is likely to generate controversy. A discussion of these and any other burdens placed on the public through FMP regulations should be a part of the FMP's supporting analyses.
>
> The relative distribution of gains may change as a result of instituting different sets of alternatives, as may the specific type of gain. The analysis of benefits should focus on the specific gains produced by each alternative set of management measures, including the status quo. The benefits to society that result from the alternative management measures should be identified, and the level of gain assessed."

The purpose of the practicability analysis, therefore, is to describe the potential burdens and gains (costs and benefits) associated with measures intended to minimize the adverse effects of

fishing on EFH in a comparative fashion that allows decision makers and interested parties to discriminate between the various alternatives. Major challenges to developing such an analysis are that there is uncertainty regarding the magnitude of both costs and benefits, and there is variation amongst decision makers and interested parties in terms of their risk tolerance and the time horizon over which they are willing to delay gains, if burdens are immediate but gains are more long-term. Also, tradeoffs between user groups are inherent to many of the alternatives, and a measure may appear practicable to some individuals but not to others depending on their economic interests or values.

As the overarching objective of the Magnuson-Stevens Act is to achieve optimum yield in the various fisheries, both benefits and costs can be viewed in this framework. Generally, the habitat management measures in this amendment seek to conserve areas vulnerable to the impacts of fishing so that fish dependent on these areas, particularly juveniles, can have better opportunities for recruitment, survival, growth, and reproduction. The concept is that fishing restrictions enhance the ability of the habitat area to provide these opportunities, and that in aggregate, increased fitness for individuals will contribute to the stock being more productive. This in turn allows for improved harvest opportunities and therefore increases economic benefits. A less tangible benefit is that habitat protection measures may help to buffer the stock against negative conditions and thereby reduce risk. For example, providing the best possible habitat conditions for recruitment of juvenile fish may be more important in years where spawning was less successful and there are fewer potential recruits. Management of risk may be especially important for stocks at low abundance.

Because habitat-specific production rates are rarely known, quantifying these benefits is very challenging in a single species context; let alone in a multispecies context amidst shifting regulations and environmental conditions. Benefits can be described qualitatively in terms of a particular alternative's likelihood of producing positive outcomes across various stocks, which may then translate over the long term into positive economic outcomes for various fisheries.

Costs may appear to be more readily quantifiable but are also difficult to evaluate. The analyses for this amendment estimate potential revenue displacement from currently fished areas, which can be viewed as an upper bound of the costs associated with area closure. However, depending on fishing opportunities outside of the proposed management area, it may be possible to fully or at least partially redistribute displaced effort to other fishing locations. Fishing in these other locations could have higher or lower variable costs depending on factors such as fish abundance, distance from port, environmental characteristics such as depth or bottom type that make fishing more efficient or more challenging, etc. For areas currently closed to fishing, costs and benefits are somewhat more difficult to evaluate, because there is less information available to evaluate potential fishing opportunities inside the closure.

Short-term (occasionally refered to as short-run in the impacts analysis) generally means impacts that accrue within a one to two year timeframe, i.e. before fishery participants would have the ability to adjust their capital investment to compensate for management changes. Generally, long-term or long-run is anything beyond short-term, but in this analysis the long-term time horizon a bit longer, and assumes that enough time has been allowed to see improvements in stock production via conservation measures. This time is going to vary based on the life history

and current status of the resource under consideration, but is closer to a 5-10 year timeframe than a 2-5 year timeframe. Obviously, assuming that other fishery measures remain constant, habitat management-mediated changes will accrue gradually over time, but clear benefits may not be demonstrated until later.

The remainder of this section compares the expected costs and benefits of specific alternatives in a qualitative fashion, drawing from the impacts analyses in Volume 3. The focus is on the habitat management alternatives and not on the spawning or research alternatives, as the habitat measures are intended to minimize the adverse effects of fishing on Essential Fish Habitat, and thus subject to the practicability requirement of the Magunson-Stevens Act. The practicability of alternatives relative to one another (within a sub-region or across sub-regions) is not explicitly ranked because both benefits and costs are expected to be highly heterogeneous across biological resources and fisheries. Rather, this section attempts to summarize key findings of the impacts analysis and highlight the issues that seem to be most important when evaluating the tradeoffs associated with particular alternatives. Obviously, both decision makers and members of the public will rank the alternatives given the considerations they value most highly.

The impacts of the habitat management alternatives are summarized in a series of sub-regional tables according to the color-coding/descriptions shown below. The detailed direct effects analysis on which these tables are based is provided in Volume 3, Section 4, and the magnitude qualifiers 'highly', 'moderately', and 'slightly' correspond with the qualifiers used in that volume. Note that even with respect to a single VEC, these summary statements may combine positive and negative effects into a single estimate of overall impact, such that the single estimates are an oversimplification of often multi-faceted analyses. In many cases, different short-term vs. long-term impacts are anticipated, especially in terms of economic and social impacts, where there may be short term effort displacements, but long term stock benefits and therefore economic and social benefits are expected. For this reason, the summary tables explicitly decompose short and long run human and community impacts. In cases where a range of potential impacts is provided in Volume 3, the more extreme of the two values is shown in the tables, so that impacts that should be considered when evaluating tradeoffs are not missed by the reader. For example, impacts ranging from neutral to slightly negative would be noted as slightly negative in the summary, and impacts ranging from moderately to highly positive would be noted as highly positive. To reiterate, this section is intended to serve as a guide to, and not a substitute for, review of the more detailed impacts analysis sections.

Symbol	Meaning
+++	highly positive
++	moderately positive
+	slightly positive
0	neutral
-	slightly negative
--	moderately negative
---	highly negative
Negl	negligible
Unk	Unknown or uncertain

Impacts on the following valued ecosystem components were evaluated as neutral across all alternatives in all sub-regions and will not be discussed further in this section: sea scallop resource, red crab resource and fishery, clam resource, bluefish resource and fishery, mackerel/squid/butterfish resource, dogfish resource and fishery, tilefish resource and fishery, and shrimp resource. Rationales and discussions surrounding these determinations can be found in Volume 3.

Eastern Gulf of Maine

In this sub-region, in addition to the general list of neutral impacts provided above, impacts on the following resources were evaluated as neutral across all alternatives: protected resources, small-mesh multispecies fishery, monkfish resource and fishery, skate fishery, sea scallop fishery, mackerel/squid/butterfish fishery, summer flounder/scup/black sea bass resource and fishery, shrimp fishery, and lobster fishery.

Table 1 – Impacts of the eastern Gulf of Maine habitat management alternatives. Only categories with at least one non-neutral impact are shown.

Alternative	Habitat	Large mesh res.	Econ. short run	Econ. long run	Social short term	Social long term	Small mesh res.	Skate res.	Herring res.	Herring fishery	Clam fishery	Lobster res.
Alt. 1 (No action)	-	-	0	0	0	0	-	0	0	0	0	0
Alt. 2 Options 1, 2, 5	+	++	-	+	-	+	+	+	+	--	-	+
Alt. 2 Options 3 and 4	Unk	0	-	-	-	-	-	0	+	0	0	+
Alt. 3 Options 1 and 2	++	++	-	+	-	+	+	+	+	0	-	+
Alt. 3 Options 3 and 4	Unk	0	-	-	-	-	-	0	+	0	0	+

Taking no action (Alternative 1) in this sub-region will continue a system of no habitat management areas. This alternative is expected to have slightly negative impacts on seabed habitats and small and large mesh groundfish resources, and neutral impacts on other resources and on the human community.

Overall, Alternative 1/No Action can likely be considered practicable. It does not have substantial negative impacts in any categories, and it continues the current condition of no management areas, such that there are no implementation or enforcement costs. In addition, there would not be any unintended negative consequences associated with new management measures. In other words, while positive habitat and managed resource benefits are not present, neither are negative costs associated with management.

Alternative 2 implemented as a closure to mobile bottom-tending gear (Option 1 or 2) and other gears capable of catching groundfish (Option 5) is expected to have slightly positive impacts on seabed habitats and various managed resources, including small-mesh multispecies, skate, herring, and lobster. The alternative is expected to have positive impacts on large mesh groundfish resources. In the short run, slightly negative economic and social impacts are expected, which will concentrate in the herring fishery due to prohibition of purse seines under Option 5, and in the clam fishery due a prohibition on toothed/dry clam dredges via Option 1 or

2 (Option 2 would exempt hydraulic dredges, not the type of dredges used along the Maine coast). Over the longer term, if the habitat conservation measures help to increase productivity of the managed resources in the sub-region, particularly large mesh groundfish, positive economic and social benefits are expected. Selecting Option 2 over Option 1 is of little practical benefit as the hydraulic dredges that would be exempted under this alternative do not fish in this area.

The costs and benefits associated with Alternative 3 implemented as a closure to mobile bottom-tending gear (Option 1 or 2) are very similar, except that slightly increased habitat conservation benefits are expected. Because this alternative does not include an option to prohibit all gears capable of catching groundfish, the negative impacts on the herring purse seine fishery would not occur. This fishing activity occurs in the Eastern Maine HMAs, and therefore if Option 5 were applied to the smaller version of the area included in Alternative 3, negative impacts would also be expected.

Alternatives 2 and 3 as mobile bottom-tending gear closures can likely be considered practicable, but for different reasons from Alternative 1/No Action. Impacts are slightly positive to positive for various managed resources and seabed habitats in general, and economic and social impacts are only expected to be slightly negative in the short run, with slightly higher impacts in the herring fishery if the Large Eastern Maine HMA is closed to gears capable of catching groundfish including purse seines under Alternative 2, Option 5.

A facet to consider with either Alternative 2 or Alternative 3 is that conservation benefits associated with the Machias area may be less if the eastern portion of the Machias HMA (within the disputed grey zone portion of the EEZ) continues to be fished by Canadian vessels using trawls or dredges. The extent to which this type of fishing activity is currently occurring is not clear.

The impacts associated with Alternatives 2 and 3 as gear modification areas (Options 3 and 4) are similar to No Action. Because there would be a cost associated with compliance with the gear measures, without a corresponding increase in benefits over the long term, slightly negative, long term human community impacts are expected, as compared to the neutral No Action impacts. To the extent that the new gear requirements reduce bottom trawling inshore where lobsters and herring egg beds occur, the gear modification options would have slightly positive impacts on these resources through reductions in incidental lobster mortality and reduced impacts on benthic herring eggs, but these benefits are probably not a substantive improvement over No Action.

Alternatives 2 and 3 with the gear modification options are likely not practicable, as benefits are not expected to be substantial and there are negative costs associated with implementing the new areas and gear restrictions.

Central Gulf of Maine

In this sub-region, in addition to the general list of neutral impacts provided above, impacts on the following resources were evaluated as neutral across all alternatives: small mesh fishery, monkfish resource and fishery, herring resource and fishery, clam fishery,

mackerel/squid/butterfish fishery, summer flounder/scup/black sea bass resource and fishery, shrimp fishery, and lobster resource and fishery.

Table 2 – Impacts of the central Gulf of Maine habitat management alternatives. Only categories with at least one non-neutral impact are shown.

Alternative	Habitat	Large mesh res.	Econ. short term	Econ. long term	Social short term	Social long term	Prot. res.	Small mesh res.	Skate res.	Skate fishery	Sea scallop fishery
Alt. 1 (No action)	+++	+	+	+	0	0	0	-	+	-	0
Alt. 2 (No area)	---	--	+	-	+	-	-	-	-	+	+
Alt. 3 Options 1 and 2	+++	-	+	-	-	-	-	-	-	+	-
Alt. 3 Options 3 and 4	---	--	-	-	-	-	-	-	-	+	+
Alt. 4 Options 1 and 2	++	-	+	-	-	-	-	-	-	+	+
Alt. 4 Options 3 and 4	---	--	-	-	-	-	-	-	-	+	+

Taking no action (Alternative 1) is expected to have slightly positive to highly positive impacts on seabed habitats, large mesh groundfish, and skates, and in general is expected to have slightly positive economic benefits over both the short and long run. Slight negative impacts on small-mesh multispecies would occur if the presence of the management areas in this sub-region causes increased effort on small-mesh multispecies, but this would be an indirect effect. The Cashes Ledge Closure Area could be slightly constraining on the skate fishery and thus may be having a slight negative impact. Weighing the positive, neutral, and negative impacts, Alternative 1 generally appears to be practicable.

Alternative 2, which would remove all habitat management areas in this sub-region, is expected to have highly negative impacts on seabed habitats, moderately negative impacts on large mesh resources, and slightly negative impacts on protected resources, small-mesh multispecies, and skates. Slightly positive social and economic impacts are anticipated over the short term, and there could be some increased access for the skate and sea scallop fisheries if these areas reopen to fishing. Weighing the negativeand positive impacts, Alternative 2 does not appear to be practicable because there are some larger negative impacts and only slightly positive impacts.

Alternative 3 as a mobile bottom-tending gear closure (Option 1 or 2) is expected to have highly positive impacts on seabed habitats as it focuses protection on vulnerable seabed types and allows access to surrounding fishing grounds, such that effort is not displaced onto more vulnerable habitat types. Relative to current management areas, Alternative 3 is expected to have slightly negative impacts on large and small mesh multispecies and skates, particularly those that occur in this region and are overfished. Because the alternative would allow fishing access in some areas, short run economic impacts are expected to be slightly positive, and this could include access that would slightly benefit the skate fishery. Slightly negative long term economic and short and long term social impacts are expected, and the scallop fishery would be displaced from Platts Bank, causing a slight negative impact. Given the somewhat limited scope of benefits for managed resources, combined with the limited potential for fishery benefits, this alternative appears to be moderately practicable.

Alternative 4 as a mobile bottom-tending gear closure (Option 1 or 2) is expected to have very similar impacts to Alternative 3, except that there would be no protection afforded to Platts Bank and Fippennies Ledge under Alternative 4. This mitigates the slightly negative impacts on the scallop fishery associated with Alternative 3. These changes probably do not have a significant effect on the overall lack of practicability of the alternative. Short and long term economic and social impacts are also expected to be slightly negative. Slight positive impacts on the skate and sea scallop fisheries are expected due to increased access to fishing grounds.

The expected impacts of Alternatives 3 and 4 implemented as gear modification areas (Option 3 or 4) are the same; negative impacts on seabed habitats and large mesh groundfish, and slightly negative impacts on small mesh groundfish, skates, and protected resources. Slightly negative impacts on the human community are also expected. Slightly positive impacts are anticipated on the scallop and skate fisheries. Given the overall negative skew to the impacts of these alternatives, they do not appear to be practicable.

Western Gulf of Maine

In this sub-region, in addition to the general list of neutral impacts provided above, impacts on the following resources were evaluated as neutral across all alternatives: monkfish resource, skate fishery, sea scallop fishery, clam fishery, mackerel/squid/butterfish fishery, summer flounder/scup/black sea bass resource and fishery, and lobster fishery.

Table 3 – Impacts of the western Gulf of Maine habitat management alternatives. Only categories with at least one non-neutral impact are shown.

Alternative	Habitat	Large mesh res.	Econ. short term	Econ. long term	Social short term	Social long term	Prot. res.	Small mesh res.	Small mesh fishery	Monkfish fishery	Skate res.	Herring res.	Herring fishery	Shrimp fishery	Lobster res.
Alt. 1 (No action)	+++	+	++	++	0	0	0	-	0	0	++	+	0	0	0
Alt. 2 (No area)	---	--	++	--	+	--	-	-	+	+	--	-	0	0	+
Alt. 3 Opt. 1 and 2	+++	+++	--	++	--	++	-	+	--	+	-	+	-	---	+
Alt. 3 Opt. 3 and 4	---	--	-	--	--	--	-	-	0	+	0	+	-	0	+
Alt. 4 Opt. 1 and 2	+++	+++	--	++	--	+	-	+	--	+	0	+	-	---	+
Alt. 4 Opt. 3 and 4	---	--	-	--	--	--	-	-	0	+	0	+	-	0	+
Alt. 5 Opt. 1 and 2	+++	++	--	++	--	+	-	+	-	+	0	+	-	--	+
Alt. 5 Opt. 3 and 4	---	--	-	--	-	-	-	-	0	+	0	+	-	--	+
Alt. 6 Opt. 1 and 2	--	-	+	-	+	-	-	-	Negl	+	-	-	0	0	0
Alt. 6 Opt. 3 and 4	---	--	-	--	-	--	-	-	+	+	-	-	0	0	0
Alt. 7A	+	0	0	0	0	0	0	+	0	0	0	0	0	0	0
Alt. 7B	+	+	0	0	0	0	0	+	0	0	0	0	0	0	0
Alt. 8	0	+	0	0	0	0	0	0	0	0	0	0	0	+	0

Taking no action (Alternative 1) is expected to have positive impacts on seabed habitats generally, and slightly positive or positive impacts on large mesh groundfish, skates, and herring. The areas have a moderate to high degree of overlap with EFH for many groundfish stocks, including those associated with structured habitats. No Action may have slight negative impacts on small-mesh multispecies through effort displacement onto these resources. Over the short and long run, positive economic benefits are expected due to continued conservation benefits of the alternative. Other impacts are expected to be neutral. Given the generally neutral to positive impacts associated with this alternative, it is considered to be practicable.

Alternative 2, which would remove all habitat management areas in this sub-region, is expected to have highly negative impacts on seabed habitats, negative impacts on large mesh resources and skates, and slightly negative impacts on small-mesh multispecies, herring, and protected resources. Positive economic and slightly positive social impacts are anticipated in the short run, but over the longer term impacts are expected to be negative. Positive impacts on the small-mesh and monkfish fisheries are expected to result from removal of the management areas.

Alternative 3 as a mobile bottom-tending gear closure (Option 1 or 2) is expected to have highly positive impacts on large mesh groundfish, positive impacts on seabed habitats generally, and slightly positive impacts on the small-mesh multispecies, herring, and lobster resources. Slightly negative impacts are expected on the skate resource and protected resources due to loss of protection in the northern part of the existing Western Gulf of Maine Closure Area/Habitat Closure Area. In the short run, overall human and community impacts would be negative, and there would be negative impacts on the small mesh and shrimp fisheries. Slightly negative impacts on the herring fishery are also expected due to overlaps between the Large Bigelow Bight HMA and small mesh trips targeting herring. Over the long run, positive human and community impacts are expected, given the expected conservation benefits.

Practicability of Alternative 3 depends on the time horizon and the ability of effort in impacted fisheries to be displaced into other areas that remain opened or are newly opened. In the short term, this alternative appears somewhat impracticable, but over the long term, practicability improves. The inclusion of the Large Bigelow Bight HMA, which is where much current fishing activity occurs, improves the conservation benefits of the alternative substantially, in particular for groundfish, as indicated by both the hotspot and EFH overlap analyses.

Alternative 3 implemented as gear modification areas (Option 3 or 4) is expected to slightly reduce trawl gear use in inshore areas, which could have slightly positive impacts on the herring resource (egg bed protection) and the lobster resource (incidental mortality reduction). Increases in access could result in slight positive impacts for the monkfish fishery. Otherwise, impacts of this alternative are expected to be neutral, slightly negative, or moderately negative. Given the generally neutral to negative impacts, this alternative is not practicable.

Alternative 4 as a mobile bottom-tending gear closure (Option 1 or 2) is expected to have very similar impacts to Alternative 3. This alternative would maintain a habitat management area on Jeffreys Ledge, which reduces negative impacts on the skate resource. As with Alternative 3/Option 1 or 2, this alternative has lower practicability in the short term due to fishing effort displacement, but becomes more practicable over a longer time horizon due to positive benefits

on managed resources that are expected to translate into increased stock productivity and positive economic benefits.

Alternative 4 implemented as gear modification areas (Option 3 or 4) is expected to have similar impacts and practicability as Alternative 3/Option 3 or 4.

Alternative 5 is a subset of the areas included in Alternative 4. Alternative 5 as a mobile bottom-tending gear closure (Option 1 or 2) is expected to have similar impacts to Alternatives 3 and 4, with a few key differences. Impacts on large mesh groundfish are expected to be positive vs. highly positive, due to a lower overlap with juvenile groundfish habitats afforded by the Small Bigelow Bight HMA, as compared to the Large Bigelow Bight HMA. However, this mitigates negative impacts on the shrimp fishery somewhat because shrimping would be allowed north of the Small Bigelow Bight HMA; estimates of displaced revenue are much lower for the smaller area. This is true for scallop dredge and non-shrimp bottom trawl revenues as well. In terms of practicability, while conservation benefits are reduced, negative short term human and community impacts would also be reduced. Given that immediate revenue displacement impacts are more certain that long term conservation and economic benefits, this means that Alternative 5 is probably more practicable than Alternative 4.

Alternative 5 implemented as gear modification areas (Option 3 or 4) is expected to have similar impacts and practicability as Alternatives 3 and 4/Option 3 and 4. The Small Bigelow Bight HMA as compared to the larger one is expected to mitigate negative impacts of gear restrictions, resulting in smaller negative social and shrimp fishery impacts.

Alternative 6 as a mobile bottom-tending gear closure (Option 1 or 2) is expected to have slightly positive impacts on seabed habitats generally; while the area covered by this alternative is lower than Alternatives 3, 4, and 5, there is still overlap with EFH for many managed species/lifestages. Impacts on large mesh groundfish are expected to be slightly negative due to losses in protection for Jeffreys Ledge and the lack of new management areas inshore in the Bigelow Bight. Because this alternative opens areas relative to Alternative 1, in the short term positive economic and social impacts are expected, included increased access for the groundfish and monkfish fisheries, but lower conservation benefits result in slightly negative impacts in the long run. Slightly negative impacts on protected resources, small mesh multispecies, skates, and herring are also expected. Overall, this alternative has fewer positive conservation benefits and long term human community benefits, but reduced human community impacts in the short term. In the short term, the additional flexibility in where and when to fish provides a case for practicability, but this support erodes in the long term, as the impact to productivity translates into future economic losses.

Alternative 6 implemented as a gear modification area (Option 3 or 4) is expected to have slightly negative to negative impacts, except for on the small mesh and monkfish fisheries. Given the lack of conservation benefits and the limited positive human community impacts, this alternative is likely not practicable.

Alternatives 7A and 7B are generally expected to afford neutral impacts as they would be a slight expansion in the gear types covered by the existing roller gear restriction (7A), or the gear types

and spatial coverage associated with that restriction (7B). Alternative 8 has generally neutral impacts, and would be slightly positive for the shrimp fishery as additional access would be afforded for those vessels should other circumstances allow. All three alternatives are considered fairly practicable given that impacts are neutral to slightly positive.

Georges Bank

In this sub-region, in addition to the general list of neutral impacts provided above, impacts on the following resources were evaluated as neutral across all alternatives: small mesh resource, monkfish resource, herring fishery, mackerel/squid/butterfish fishery, summer flounder/scup black sea bass fishery, and shrimp fishery.

Table 4 – Impacts of the Georges Bank habitat management alternatives. Only categories with at least one non-neutral impact are shown.

Alternative	Habitat	Large mesh res.	Econ. short term	Econ. long term	Social short term	Social long term	Protected res.	Small mesh fishery	Monkfish fishery	Skate res.	Skate fishery	Sea scallop fishery	Herring res.	Clam fishery	SF/SC/BSB res.	Lobster res.	Lobster fishery
Alt. 1 (No action)	++	++	---	---	0	0	0	0	0	+	-	-	+	0	+	0	0
Alt. 2 (No area)	--	---	+++	+++	++	--	-	+	++	-	+	+++	-	0	0	-	-
Alt. 3 Opt. 1	++	--	+++	++	++	--	-	0	++	-	++	-	+	-	+	-	-
Alt. 3 Opt. 2	++	--	+++	++	++	--	-	0	++	-	++	-	+	0	+	-	-
Alt. 3 Opt. 3 and 4	--	--	+++	++	++	--	-	0	++	-	++	+++	+	0	0	-	-
Alt. 4 Opt. 1	++	--	+++	++	++	--	-	-	++	-	++	-	+	-	+	-	-
Alt. 4 Opt. 2	++	--	+++	++	++	--	-	-	++	-	++	-	+	0	+	-	-
Alt. 4 Opt. 3 and 4	--	--	+++	++	++	--	-	-	++	-	++	+++	+	0	0	-	-
Alt. 5	--	--	++	++	-	-	-	-	++	-	++	+++	+	--	+	-	-
Alt. 6A Opt. 1	+++	-	--	---	--	--	-	0	++	-	++	--	+	--	+	-	-
Alt. 6A Opt. 2	+++	-	--	---	--	--	-	0	++	-	++	--	+	0	+	-	-
Alt. 6A Opt. 3 and 4	--	--	+++	+++	+	--	-	0	++	-	++	+++	+	0	0	-	-
Alt. 6B Opt. 1	-	---	+++	+++	++	--	-	0	++	-	++	+	+	--	+	-	-
Alt. 6B Opt. 2	-	---	+++	+++	++	--	-	0	++	-	++	+	+	0	+	-	-
Alt. 6B Opt. 3 and 4	--	---	+++	+++	+	--	-	0	++	-	++	+++	+	0	0	-	-
Alt. 7 Opt. 1 and 2	+	---	+++	+++	++	-	-	-	0	-	0	+++	+	--	+	-	-
Alt. 8 Opt. 2 and 2	+++	++	---	---	--	--	-	-	-	-	--	---	+	--	+	0	0

Impacts of the alternatives in the Georges Bank sub-region are more extreme (i.e., highly positive or negative) and strongly contrasting across VECs than for any other sub-region. Alternatives 1 and 8 are the only alternatives expected to have positive impacts on large mesh groundfish resources, but both of these alternatives have strongly negative economic impacts over both the short and long run. Alternatives 1, 3, 4, 6A, and 8, which continue to preclude access to scallop resource on the northern edge, or close off currently fished scallop beds on the

northern edge, are expected to have a slightly negative to negative impact on the scallop fishery. Alternatives 3, 4, 5, 6A, 7, and 8, without exemptions for hydraulic dredges, are expected to have slightly negative to negative impacts on the clam fishery. With these exemptions, these sets of areas have neutral impacts on the clam fishery.

Given the impacts analysis, it is difficult to draw conclusions in this sub-region about whether any of the alternatives are practicable overall. A more tractable approach is to focus on how the alternatives vary in terms of tradeoffs across various resources and fisheries. For example, the benefits of access are likely to accrue mainly to the scallop fishery, while the long run impacts will be felt by the groundfish fishery when the negative impacts to groundfish stocks materialize due to a reduction in conservation measures that benefit these stocks. These scallop access benefits are likely to occur in the near term and are more easily quantified, while costs to the groundfish resource and fishery are harder to estimate and will likely be observed in the future.

Great South Channel/Southern New England

In this sub-region, in addition to the general list of neutral impacts provided above, impacts on the following resources were evaluated as neutral or negligible across all alternatives: small mesh resource and fishery, skate resource, shrimp fishery, and lobster resource and fishery.

Table 5 – Impacts of the Great South Channel/Southern New England habitat management alternatives. Only categories with at least one non-neutral impact are shown.

Alternative	Habitat	Large mesh res.	Econ. short term	Econ. long term	Social short term	Social long term	Prot. res.	Monkfish fishery	Skate fishery	Sea scallop fishery	Herring res.	Herring fishery	Clam fishery	MSB fishery	SF/SC/ BSB res.	SF/SC/ BSB fishery
Alt. 1 (No action)	-	0	--	--	0	0	0	0	-	0	+	0	-	0	+	-
Alt. 2 (No area)	+	-	+	+	+	-	-	+	+	0	-	0	++	+	0	0
Alt. 3 Opt. 1	++	+	---	---	--	-	-	+	0	--	+	-	--	0	+	-
Alt. 3 Opt. 2	+	+	---	---	--	-	-	+	0	--	+	-	0	0	+	-
Alt. 3 Opt. 3 and 4	0	Unk	++	++	+	+	-	+	0	0	+	-	0	0	0	0
Alt. 4 Opt. 1	+	Unk	--	+	--	++	-	+	0	-	+	-	--	0	+	-
Alt. 4 Opt. 2	+	Unk	++	-	+	++	-	+	0	-	+	-	0	0	+	-
Alt. 4 Opt. 3 and 4	0	Unk	++	--	+	-	-	+	0	0	+	-	0	0	0	0
Alt. 5 Opt. 1	+	Unk	-	+	--	++	-	+	0	0	+	-	--	0	+	-
Alt. 5 Opt. 2	+	Unk	+	+	+	++	-	+	0	0	+	-	0	0	+	-
Alt. 5 Opt. 3 and 4	0	Unk	+	--	+	-	-	+	0	0	+	-	0	0	0	0
Alt. 6	0	Unk	--	--	--	--	-	+	0	0	+	-	--	0	+	-

The impacts of the alternatives in the Great South Channel/Southern New England region are generally neutral to slightly positive or negative, with a few impacts that are more significant in magnitude. The large mesh groundfish and economic impacts conclusions are uncertain relative to those for other regions, so the summary values in the table above should be considered somewhat cautiously.

Taking no action in this sub-region via Alternative 1 generally has neutral to slightly negative impacts. Although these management areas are probably having a slight positive benefit on the herring and summer flounder/scup/black sea bass resources, this conclusion holds across many of the alternatives in the sub-region, such that Alternative 1 does not appear to provide additional conservation benefits for these stocks relative to other alternatives. Slightly negative short and long run economic impacts are highly uncertain but are expected to result from the potential for the existing areas to be shifting effort onto more vulnerable habitat types, i.e. there is a conservation opportunity cost to the current management in this sub-region.

Alternative 2 would remove existing management areas. The negative impacts on seabed habitats and large mesh groundfish are only slight, due to the generally neutral impacts associated with Alternative 1/No Action. The removal of management areas would provide some flexibility in fishery access, resulting in slight positive economic benefits, which could accrue in the groundfish, monkfish, skate, mackerel/squid/butterfish, summer flounder/scup/black sea bass, and especially clam fisheries. This alternative appears to be practicable.

Alternative 3 is fairly distinct from the other alternatives in this sub-region in terms of its impacts. The Great South Channel East HMA includes clam, scallop, and groundfishing areas, with much of this revenue coming from the northern and eastern edges of the area that lie outside the Great South Channel HMA proposed in Alternative 4. While this alternative has the greatest potential conservation benefits for seabed habitats and the large mesh groundfish resource, the economic and social impacts are substantially more negative relative to other alternatives in the sub-region. The highly negative economic impacts make the alternative impracticable relative to others. While an exemption for clam dredges (Option 2) would mitigate impacts on that fishery, the overall economic impacts of Alternative 3/Option 2 remain highly negative, given that the vast majority of mobile bottom-tending gear revenue in the area can be attributed to scallop dredges. Therefore, applying Option 2 instead of Option 1 does not render this alternative practicable.

Alternative 3 as a set of gear modification areas (Option 3 or 4) is expected to have neutral and uncertain impacts on seabed habitats and large mesh groundfish, respectively. The alternative would increase fishing access to some existing areas, and the gear modifications would not apply to dredge gears, so the overall economic and social impacts are expected to be positive. This alternative is probably not significantly different Alternative 2 in terms of practicability.

Alternative 4 as a mobile bottom-tending gear closure (Option 1) is expected to have some slightly positive resource impacts (seabed habitats, monkfish, herring, summer flounder/scup/black sea bass). Large mesh groundfish impacts are uncertain. Short term economic impacts are slightly negative, mainly due to potential revenue displacement in the clam fishery. This effort displacement is mitigated through selection of Option 2, which would exempt hydraulic dredges. Although longer term conservation benefits to groundfish are uncertain, and are likely lower for Alternative 4 as compared to Alternative 3, long term economic impacts are expected to be slightly positive through increases in resource productivity. For Alternative 4, the potential benefits outweigh the negative short term costs, which makes this alternative more practicable than Alternative 3, where effort displacement in the scallop fishery dominates the

conclusions of the economic analysis over both the short and long run. Since much of the fishing effort in the area is in the clam dredge fishery, exempting this gear is expected to result in slightly negative economic impacts over the long term due to reduced groundfish conservation. Thus, Option 1 has lower short term costs as compared to Option 2, but a higher potential for long term benefits.

Alternative 5 as a mobile bottom-tending gear closure (Option 1) is expected to have some slightly positive resource impacts (seabed habitats, monkfish, herring, summer flounder/scup/black sea bass). Large mesh groundfish impacts are uncertain. Short term economic impacts are slightly negative, mainly due to potential revenue displacement in the clam fishery (slightly greater effort displacement is expected relative to Alternative 4). This effort displacement is mitigated through selection of Option 2, which would exempt hydraulic dredges. As with Alternative 4, because much of the fishing effort in the area is in the clam dredge fishery, exempting this gear is expected to result in slightly negative economic impacts over the long term due to reduced groundfish conservation. Thus, Option 1 has lower short term costs as compared to Option 2, but a higher potential for long term benefits.

Alternative 6 shifts the boundary of the Nantucket Shoals HMA west and south, which increases overlap with the clam fishery and therefore increases the potential revenue displacement. This, combined with gear modification requirements in the Great South Channel GMA, makes the overall economic impacts slightly negative in both the short and the long run. Option 2 would mitigate some of the economic impacts due to an exemption for the clam dredge fishery, but lower conservation benefits would be expected as well, such that overall economic impacts are still expected to be slightly negative. Given neutral seabed impacts and similar impacts across other VECs, this alternative is somewhat less practicable than Alternatives 4 and 5.

3 Cumulative effects analysis

The Council on Environmental Quality requires that Environmental Impact Statements (EISs) contain a cumulative effects assessment. The purpose of this assessment is to describe the combined effects of many actions that may be missed if these actions are analyzed individually. This section describes the potential direct and indirect effects of the alternatives in Omnibus Essential Fish Habitat Amendment 2 together with past, present, and reasonably foreseeable future actions that affect the New England fishery environment.

Cumulative effects are described relative to the Valued Ecosystem Components (VECs) identified in the Affected Environment section of this EIS (Volume 1, Section 4). These VECs are:

- Physical and biological environment, with a focus on seabed habitats in particular
- Managed species – this includes all species managed by the New England Fishery Management Council as well as species managed by other authorities that occur in the New England Region where changes to spatial management measures are under consideration
- Human communities and the fishery – this includes fisheries targeting the above managed species, and the communities associated with those fisheries
- Protected resources – this includes large and small cetaceans, pinnipeds, sea turtles, Atlantic sturgeon, and Atlantic salmon that occur in the New England Region where changes to spatial management measures are under consideration

The cumulative effects analysis describes (1) the baseline status of all VECs, (2) past, present, and forseeable future actions, (3) the cumulative effects of the proposed action, and (4) a cumulative effects summary, combining the effects of past, present, and future actions with the effects of the proposed action. The analysis will of course be updated when the Council selects final preferred alternatives for submission to NMFS, i.e. when a proposed action has been identified. For the draft EIS, the focus is on preferred alternatives, where they have been identified, and on how these alternatives fit into the range of possible impacts. In cases where preferred alternatives have not been identified, i.e. the habitat management alternatives for the Georges Bank and Great South Channel/Southern New England sub-regions, the analysis focuses on the range of potential impacts across the various alternatives and VECs. Because the alternatives in this amendment are numerous, this analysis does not attempt to estimate cumulative impacts associated with every possible combination of alternatives.

The geographic scope of this analysis includes the New England region, as delimited by the New England/Mid-Atlantic inter-council boundary. The region includes U.S. waters in the Gulf of Maine, on Georges Bank, and in Southern New England, together with the continental shelf and slope off Georges Bank and Southern New England to the EEZ boundary. Essential Fish Habitat and Habitat Area of Particular Concern designation alternatives in the amendment do extend south of this boundary, but these designations are administrative in nature and have direct impacts that are limited to a general influence on management decision making and the EFH consultation process. All habitat, spawning, and research area management alternatives that

would substantively affect fishing operations as well as other VECs are within the New England region.

The temporal scope of this analysis extends backwards in time to the initiation of federal fisheries management, but focuses on the most recent major action in any given fishery management plan, as well as other relatively recent changes in non-fishing activities. The analysis goes forward in time ten years from the planned implementation date of 2015 (i.e. to 2025), although obviously near-term actions are more reliably identified. Given the time it takes many species to recruit to the fishery, the benefits of habitat conservation measures that protect juvenile fish are expected to be realized as productivity benefits at the stock level sometime around the five year mark. It will take slightly longer to translate increases in productivity into increased landings and economic benefits. Therefore, evaluating cumulative effects up to ten years into the future is consistent with the anticipated conservation and fishery production outcomes of the alternatives in this amendment.

3.1 Past, present, and foreseeable future actions

This section describes past, present, and future forseeable actions that have effects on the valued ecosystem components evaluated in this amendment.

3.1.1 Fishery management actions

Federal fishery management plans are developed to optimize yield in U.S. fisheries and to comply with the Magnuson-Stevens Act as reauthorized through 2007. The legislation promotes long-term positive impacts on the environment in the context of fisheries activities, stipulating that management plans must comply with a set of National Standards that collectively serve to optimize the conditions of the human environment. Specific goals of fishery management plans include improving or maintaining the stock structure and abundance of target species, improving economic and social outcomes, and minimizing incidental impacts, for example relative to protected resources and other non-target species. Under this regulatory regime, the cumulative impacts of past, present, and future Federal fishery management actions on the VECs should be expected to result in positive long-term outcomes, although these actions are often associated with offsetting impacts. For example, constraining fishing effort frequently results in negative short-term socio-economic impacts for fishery participants in order to bring about long-term sustainability of a given resource.

This section describes past, present, and future forseeable fishery management plan actions. Additional information about the fishery management plans that affect the New England region may be found in Volume 1 in the “Managed species and fisheries” section. Future actions for all FMPs may include additional ecosystem considerations, either within the current FMP structure or as part of an overarching ecosystem plan. The New England and Mid-Atlantic Fishery Management Councils and the Atlantic States Marine Fisheries Commission do not currently have ecosystem plans in place, but all three groups are working on expanding their efforts in this sphere and future management actions will be developed in the context of ongoing environmental change.

In some cases, as was done with this amendment, fishery management plan actions are developed in an omnibus fashion to update many plans at once. These amendments are considered amendments to the individual fishery management plans, and the actions associated with these amendments are described in the table below as needed, by FMP. Examples of this include the 1999 New England Fishery Management Council EFH amendment, which designated EFH across all species managed by the Council at that time. Another example is the recent Mid-Atlantic Council ACL/AM ominibus amendment, which implemented annual catch limits and accountability measures. The New England Council took a plan-specific approach to implementing ACLs and AMs. Conversely, while New England is taking an omnibus approach to EFH updates, the Mid-Atlantic has been updating their EFH provisions plan by plan. In general, the designation of EFH is expected to have indirect, positive impacts on managed resources by guiding the development of conservation-oriented fishery management measures, and through conservation measures recommended for non-fishing projects via the EFH consultation process. Annual catch limits and accountability measures are also expected to have generally positive impacts of managed resources because these measures are designed to limit catches to biologically sustainable levels and to provide both proactive and reactive measures to ensure that these catch limits are not exceeded. Eliminating overfishing and reducing the number of overfished stocks is expected to generate long run benefits to the human community.

One special case set of omnibus actions are the Standardized Bycatch Reporting Methodology (SBRM) amendments, which cover Federal waters fisheries managed by the New England and/or the Mid-Atlantic Councils. The first SBRM amendment became effective in 2008, and an update to these measures is currently in development. The 2007 amendment document summarizes the purpose of the SBRM amendments: “Explain the methods and processes by which bycatch is currently monitored and assessed for Northeast Region fisheries; determine whether these methods and processes need to be modified and/or supplemented; establish standards of precision for bycatch estimation for all Northeast Region fisheries; and, thereby, document the SBRM established for all fisheries managed through the FMPs of the Northeast Region. An objective of the SBRM is to establish, maintain, and utilize biological sampling programs designed to minimize bias to the extent practicable, thus promoting accuracy while maintaining sufficiently high levels of precision.” The updates currently in development address the following topics: (1) Bycatch reporting and monitoring mechanisms; (2) analytical techniques and allocation of fisheries observer effort; (3) a performance standard for the SBRM; (4) an SBRM reporting and review process; (5) framework adjustment provisions; (6) a process to prioritize the observer coverage allocations calculated based on the SBRM; and (7) provisions to allow industry-funded observers and/or observer set-aside programs (September 2013 Draft SBRM Amendment). Separate from the SBRM amendment, NMFS, in collaboration with the New England Council, is currently developing an industry-funded monitoring amendment.

Table 6 – Past, present, and future forseeable actions within the fishery management plans in operation in the New England region

Fishery Management Plan	Past actions	Present actions	Future forseeable actions
Northeast Multispecies FMP	FMP completed in 1986 by NEFMC to reduce fishing mortality and promote rebuilding. Past measures included input controls such as days-at-sea, mesh size, trip, and fish size, and permit limits, and seasonal and year-round management areas. EFH was designated in 1999.	Current management includes annual catch limits by stock and accountability measures for overages. Most fishing conducted within the sector system. Limits on mesh-size, fish size, and permits are still used, along with area management. Trip limits and days-at-sea are infrequently relied upon.	Amendment 18: considering capping accumulation limits, changes to fleet structure. Ongoing specifications actions will allocate annual catch limits in response to updated assessment information. Updates to spawning closures on the multi-year Council priority list.
Monkfish FMP	FMP completed in 1999 by NEFMC and MAFMC to address concerns about small fish in landings, gear conflicts, and expanding directed fishery. Measures included permit and day-at-sea limits, trip limits, minimum fish sizes, seasonal spawning restrictions, and gear restrictions, as well as EFH designations. A subsequent action included designation of EFH management areas closed to monkfishing in Lydonia and Oceanographer canyons.	Current management includes annual catch limits by stock and accountability measures for overages. In addition to original FMP measures, current management includes various exemption areas for trawls and gillnets where vessels can use large mesh and are not required to use a Multispecies day-at-sea. Management is closely tied to Northeast Multispecies FMP. Habitat closure areas in two canyons.	Amendment 6: considering modifications to days-at-sea program and catch shares. Ongoing specifications actions will allocate annual catch limits in response to updated assessment information.
Skate Complex FMP	FMP completed in 2003 by NEFMC to protect overfished skates and collect data about the fishery to improve management. Measures included federal permits, reporting requirements, possession limits for wing fishery, and prohibitions on landings of depleted species, as well as EFH designations.	Current management includes annual catch limits and accountability measures for overages. Possession limits now include both wing and bait fisheries.	Ongoing specifications actions will allocate annual catch limits in response to updated assessment information.
Atlantic Sea Scallop FMP	FMP completed in 1982 by NEFMC to rebuild stock and reduce interannual fluctuations in abundance. Measures included limits on	Current management includes annual catch limits and accountability measures for overages. Rotational closure/access	Ongoing specifications actions will allocate annual catch limits in response to updated assessment information. Considering adjustments to

Fishery Management Plan	Past actions	Present actions	Future forseeable actions
	permits, days-at-sea, crew size, gear restrictions, and meat count restrictions. EFH was designated in 1999 and Amendment 10 (implemented 2004) designated EFH closures, which were updated via Amendment 15 (implemented 2011) updated these areas to be consistent with those in Multispecies Amendment 13	area system combined with open area days-at-sea. Seasonal closures and groundfish sub-ACLs to limit fish bycatch, gear restrictions to limit turtle bycatch. No longer have meat count restrictions; 4 inch ring and rotational management used to optimize yield per recruit. Habitat closure areas.	Northern Gulf of Maine and LAGC management programs. Future adjustments may be made to rotational management program if additional resource is made available to fishery through lifting of habitat closures.
Atlantic Herring FMP	FMP completed in 1999 by NEFMC. Area-based quota/TAC system. EFH was also designated in 1999.	Current management includes annual catch limits and accountability measures for overages. Enhanced monitoring in groundfish management areas.	Ongoing specifications actions will allocate annual catch limits in response to updated assessment information. Actions under development will implement reporting and slippage provisions as well as monitoring adjustments. Coordination with MAFMC and ASFMC on river herring/shad monitoring/bycatch.
Deep-Sea Red Crab FMP	FMP completed in 2003 by NEFMC to address overfishing and the potential for overcapitalization. Measures included permit limits, trips limits, annual TACs, days-at-sea, and limits on gear and processing at sea, as well as the EFH designations.	Current management includes annual catch limits and accountability measures for overages.	Ongoing specifications actions will allocate annual catch limits in response to updated assessment information.
Surfclam and Ocean Quahog FMP	FMP completed in 1977 by MAFMC. Initial approaches included limited entry, quarterly quotas, and fishing time restrictions. ITQ system established in 1990.	Fishery is currently managed as an ITQ system, with annual catch limits capping total catch and accountability measures for overages. Fishing is subject to food safety/PSP closures. During 2013 a large PSP closure exemption area was opened to clam dredging on Georges Bank.	Ongoing specifications actions will allocate annual catch limits in response to updated assessment information.
Atlantic Bluefish FMP	FMP completed in 1990 to control fishing effort.	Current management includes annual catch limits and accountability measures for overages. Quotas for recreational vs.	Ongoing specifications actions will allocate annual catch limits in response to updated assessment information.

Fishery Management Plan	Past actions	Present actions	Future forseeable actions
		commercial fisheries.	
Atlantic Mackerel, Squid, and Butterfish FMP	Original FMPs in 1978. Consolidated into a single plan in 1983 by MAFMC.	Current management includes annual catch limits and accountability measures for overages. A plan amendment currently in development is considering deep-sea coral management areas in various slope and canyon environments within the mid-Atlantic region.	Ongoing specifications actions will allocate annual catch limits in response to updated assessment information.
Spiny Dogfish FMP	Joint MAFMC-NEFMC FMP implemented in 2000.	Current management includes annual catch limits and accountability measures for overages. Catches controlled by quotas and trip limits.	Ongoing specifications actions will allocate annual catch limits in response to updated assessment information.
Summer Flounder, Scup, and Black Sea Bass FMP	Merged into the summer flounder FMP in 1996.	Current management includes annual catch limits and accountability measures for overages. Catch and landings limits are the primary management tool; allocations between recreational and commercial fisheries. Also minimum fish sizes, bag Gear restricted areas to protect scup and black sea bass habitats.	Ongoing specifications actions will allocate annual catch limits in response to updated assessment information.
Tilefish FMP	Golden tilefish in the Mid-Atlantic are managed by MAFMC (FMP in 2001). Total allowable landings, rebuilding plan, limited entry, and tiered commercial quota system.	Current management includes annual catch limits and accountability measures for overages. Commercial fishery under ITQ management, with catch limit in incidental fishery. Gear restricted areas to protect sensitive tilefish habitats in the heads of canyons.	Ongoing specifications actions will allocate annual catch limits in response to updated assessment information.
Northern Shrimp FMP	ASMFC plan implemented 1986. Management measures included minimum mesh size, seasonal closures, possession limits, and reporting	Assessments and specifications process ongoing, although currently the fishery is closed given the status of the stock.	Ongoing specifications actions will allocate annual catch limits in response to updated assessment information.

Fishery Management Plan	Past actions	Present actions	Future forseeable actions
	requirements.		
American Lobster FMP	ASFMC plan in state waters, federally managed in Federal waters consistent with ASMFC approach. Area-based management system with trap limits, minimum-maximum size limits, and protections for egg-bearing females.	Area-based management system with trap limits, minimum-maximum size limits, and protections for egg-bearing females. Focus on fishing mortality reduction in Southern New England.	Ongoing specifications actions will allocate annual catch limits in response to updated assessment information.

3.1.2 Protected resources management

Protected resource management focuses on evaluation of stock status, identification of fisheries and other activities that interact with protected resources, and development of measures to minimize interactions and the negative impacts associated with interactions that do occur. Management may also include designation of critical habitats.

Table 7– Past, present, and future forseeable actions within the protected resource management plans plans in operation in the New England region

Plan	Past actions	Present actions	Future forseeable actions
Harbor Porpoise Take Reduction Plan	Spatial and seasonal gear restrictions to minimize interaction, injuries, and mortalities between fishing gear and harbor porpoises, including requirements for pingers	Modifications to plan (effective September 30, 2013) eliminate consequence closure areas.	Continue previous actions
Atlantic Large Whale Take Reduction Plan	Spatial and seasonal gear restrictions to minimize interaction, injuries, and mortalities between vertical lines and large whale species	Changes to plan were published June 2014 (79 FR 36586)	Continue previous actions
Ship strike reduction programs	Reporting systems and speed restrictions to minimize ship strike events; education/outreach activities	Ongoing development of temporary speed restricted areas as needed	Continued updates to measures to reduce ship strikes as technology improves
Sea turtle regulations	Annual fisheries observer coverage requirements for certain fisheries; requirements on handling and resuscitation. Biological opinions have led to gear requirements in sea scallop fishery, summer flounder fishery, NC/VA large mesh gillnet fishery, and VA pound net fishery.	Continue previous actions	Continue previous actions
Shortnose Sturgeon Recovery Program	Fishing for, catching or keeping shortnose sturgeon illegal; federal agencies that conduct, fund or authorize activities that may adversely affect shortnose sturgeon must consult with NOAA; periodic status reviews; development and implementation of recovery plan (1998)	Continue previous actions	Continue previous actions
Atlantic Sturgeon Recovery Program	Fishing for, catching or keeping Atlantic sturgeon illegal; various restrictions by state	Continue previous actions	Continue previous actions
Atlantic Salmon	Species listings by distinct	General Conservation Plan to	Continue previous actions

Plan	Past actions	Present actions	Future forseeable actions
Recovery Program and General Conservation Plan	population segment; designation of critical habitats	promote fish passage and dam removals	
Proactive Conservation Program for Species of Concern and Candidate Species	Grants to fund research activities, monitoring of status of species of concern/candidate species.	Continue previous actions	Continue previous actions
Stranding and disentangle ment program	Network of organizations that rescue and rehabilitate stranded mammals and turtles to reduce mortalities associated with stranding	Continue previous actions	Continue previous actions

3.1.3 Other uses of the marine environment

Non-fishing activities combine with fishery management efforts to affect the VECs considered in this action. Wherever these activities co-occur, they are likely to work additively or synergistically to decrease the quality of the physical and biological environment, and, as such, may indirectly constrain the sustainability of the managed resources, protected resources, and human communities associated with fishing. Appendix G describes the non-fishing activities that affect estuarine/nearshore environments and offshore environments.

Table 8 – Past, present, and future forseeable non-fishing activities within the New England region

Activity	Past actions	Present actions	Future forseeable actions
Liquefied natural gas facilities	Three New England import facilities, one land-based just north of Boston, MA, and two offshore of Cape Ann, MA. See http://www.northeastgas.org/about_lng.php.	Existing facilities are not especially active and imports of LNG have been down in New England. See http://www.northeastgas.org/about_lng.php.	The U.S. Department of Energy regulates import and export of natural gas and would approve new import facilities or import to export facility conversions. Given excess capacity at existing New England import terminals, new terminal construction does not appear likely, at least in the short term.
Offshore renewable wind energy	None – emerging use offshore the New England and Mid-Atlantic states	Leases have been sold in the Rhode Island/Massachusetts Wind Energy Area (July 2013), the Virginia Wind Energy Area (September 2013), for the Cape Wind project in Nantucket Sound (October 2010), the Bluewater Wind project off	Environmental assessment and eventually development activites in current leases; leasing activities in additional wind energy areas, followed by assessment and perhaps development of wind energy installations.

Activity	Past actions	Present actions	Future forseeable actions
		Delaware (November 2012), and the Deepwater Wind and Fishermen's Energy of New Jersey off New Jersey in October and November 2010. None of these wind energy areas overlap the area management alternatives directly, although they do encompass habitats for some of the managed species and protected resources identified above, as well as fishing grounds.	
Petroleum exploration	Seismic testing, drilling sediment cores and test wells. Leases sold and test wells drilled in late 1970s and early 1980s; given findings, no additional test well activity after that (see http://www.boem.gov/OCS-Report-MMS-2000-031/) for more information.	Bureau of Ocean Energy Management (BOEM) oversees these activities; currently we are within the 2012-2017 planning period. Currently there are no lease sales proposed in the Atlantic.	BOEM is currently developing the 2017-2022 Oil and Gas Leasing Program (see http://www.boem.gov/Five-Year-Program-2017-2022/) and a public request for information was published early summer 2014. It is not yet clear whether the 2017-2022 program will include potential leasing and exploration in the Atlantic.
Wave and tidal energy	Regulations for the Outer Continental Shelf Renewable Energy Program published in 2009; these include offshore wind energy as well as wave and current (i.e. hydrokinetic) energy projects. BOEM oversees development of these types of projects.	Information about current projects can be found here: http://en.openei.org/wiki/Marine_and_Hydrokinetic_Technology_Database. Various projects in Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut are in the siting/planning, site development, and device testing phases. There are no deployed projects in the New England region.	Future projects could be developed pursuant to the 2009 regulations.
Aquaculture	Existing facilities in New England are in currently in state waters only. There are facilities oriented towards commercial production as well as restoration aquaculture (e.g. oyster reefs, hatcheries).	Currently there are facilities in all coastal New England states, with the largest number of operations in Maine. NH, MA, RI, and CT focus mainly on shellfish, although NH has a steelhead trout facility. Maine raises a diversity of finfish and shellfish species including	Expansion of aquaculture appears likely and could include offshore waters in the future. Many factors influence the rate of growth in this sector such as permitting concerns, availability of suitable sites, and regulatory stability. The National Sustainable Offshore

Activity	Past actions	Present actions	Future forseeable actions
		Atlantic salmon. Salmon is the dominant finfish aquaculture species in New England. Algae and seaweeds are also currently grown.	Aquaculture Act of 2011 establishes a permitting and programmatic review system for offshore aquaculture sites, although the extensive regulatory requirements of the law could discourage entry into the system (Lapointe, 2013).
Offshore dredging and disposal: activities include mineral mining and vessel disposal		BOEM oversees offshore mineral extraction and has signed agreements with various states to evaluate sand resources for coastal resilience and restoration. The Environmental Protection Agency approves requests for vessel disposal offshore; two vessels have been disposed of in the past few years in the western Gulf of Maine.	BOEM/state collaborative surveys to identify geologic resources suitable for mining, while mapping habitat and cultural resources. Continued disposal of vessels at sea through EPA process (see http://www.epa.gov/region2/water/oceans/wrecks.htm)

3.2 Baseline status of Valued Ecosystem Components

This section summarizes the current status of all VECs, based on past and present actions but not including the proposed action.

All VECs are influenced to some degree by changes in global climate. These climate shifts may alter the pattern and strength of ocean currents; change the rate of freshwater inflows; influence water temperature, acidity, and salinity; etc. These changes affect the physical environment directly, which in turn may shape the suitability of local habitats for non-target biological features, managed fish and shellfish species, and protected resources. Changes in the abundance and distribution of these biological resources affect the communities that prosecute fisheries for these resources. For example, if the target species important to a particular port community declines in abudance or its distribution shifts north or south due to environmental factors, there may be negative economic impacts locally, although there could be positive impacts due to increases in abundance of other species. It is impossible to pinpoint the degree to which these types of environmental changes are influencing the baseline status of the VECs analyzed in this action, but certainly regional-scale changes in climate combine with fishing and non-fishing human activities to shape the baseline status.

3.2.1 Physical and biological environment

The physical and biological environment and its vulnerability to fishing gear impacts are described in Section 4.2 of Volume 1. The physical and biological environment relevant to this action includes nearshore and offshore marine habitats in the Gulf of Maine, on Georges Bank,

in the Mid-Atlantic Bight, and along the continental slope. The management alternatives focus mostly on benthic (seabed) offshore habitats in the Gulf of Maine and on Georges Bank, including seasonal management areas in the inshore Gulf of Maine as part of the spawning alternatives, and some potential year-round habitat management areas further south near and on Cox Ledge as part of the habitat alternatives. EFH and HAPC designations extend further south into the Mid-Atlantic Bight and also seaward onto the continental slope and seamounts (see Volume 2).

Fishery management actions have likely had a positive cumulative impact on the status of the physical and biological environment. Fishery management plans are required to evaluate and minimize to the extent practicable adverse effects of fishing on essential fish habitats, and these actions are assumed to have made a positive contribution to habitat condition since the habitat requirements were added to the Magnuson-Stevens Act in 1996. The overall amount of fishing activity also contributes to the condition of the physical and biological environment. In this region, the Swept Area Seabed Impact analysis (see Volume 1) indicates that bottom otter trawls are the primary source of fishery impacts on benthic habitats, and the use of this gear has been on the decline overall, due to declining activity in the large-mesh groundfish fishery. This trend likely contributes positively to the condition of the physical and biological environment.

Protected resource management actions that focus on reducing mortality rates of marine mammals, fish, and turtles may have indirect impacts on the condition of the physical and biological environment. Increases in abundance of protected resources due to conservation measures will influence marine food webs generally, which could ultimately affect the distribution and abundance of benthic fishes and non-target species of fishes and invertebrates that comprise the biological environment.

Other human uses of the marine environment are generally likely to have negative impacts on the physical and biological environment (see Appendix G). However, these activites and their associated impacts tend to be concentrated near shore, and through the essential fish habitat consultation provisions of the Magnuson Stevens Act, the National Marine Fisheries Service is provided the opportunity to request that measures be taken to mitigate negative impacts.

3.2.2 Managed species

The managed species VEC includes the following fishery resources. Section 4.3 of Volume 1 describes in detail the biology, status, and distribution of these resources, as well as the fisheries which prosecute them. The focus here is the status (overfished/overfishing occurring) of the various species, including the status by stock if the species is not managed as a single unit. Although technically a managed species, information about Atlantic salmon is located in the protected resources section, because the fishery management plan prohibits possession of Atlantic salmon and there is no commercial fishery for the stock.

- Northeast multispecies
- Monkfish
-
- Skates
- Atlantic sea scallop
- Deep-sea red crab
- Surfclam and ocean quahog
- Atlantic bluefish
- Atlantic mackerel, squid, butterfish
- Spiny dogfish
- Summer flounder, scup, and black sea bass
- Golden tilefish
- Northern shrimp
- American lobster

- Atlantic herring • •

In summary, the majority of stocks that overlap the New England region are not overfished with overfishing not occurring (Table 9 – summary, Table 10 – additional details). A small number of stocks are at low abundance, but with low fishing mortality, or at high abundance, but with high fishing mortality. Cod, some flounders, and thorny skates are overfished with overfishing occurring. In general, past fishery management actions have contributed positively to stock status, but additional action will be necessary to rebuild all stocks in the region. With the exception of thorny skate, all stocks in the overfished/overfishing category are large-mesh groundfish managed under the Northeast Multispecies Fishery Management Plan.

Table 9 – Baseline status of managed species, summary

		Increasing fishing mortality →	
		Fishing mortality below reference point	***Fishing mortality above reference point***
Increasing stock size →	***Stock size above reference point***	Not overfished, overfishing not occurring: Acadian redfish, American plaice, Georges Bank haddock, pollock, white hake, southern windowpane flounder, Southern New England/Mid-Atlantic yellowtail flounder – likely not overfished, northern and southern red hake, northern and southern silver hake, northern and southern monkfish (uncertainty in assessment), smooth skate, barndoor skate, little skate, clearnose skate, rosette skate, Atlantic sea scallop, Atlantic herring, surfclam, ocean quahog, bluefish, Atlantic mackerel (uncertainty in assessment), spiny dogfish, summer flounder, scup, black sea bass, golden tilefish	Not overfished, overfishing occurring: Gulf of Maine haddock, winter skate
	Stock size below reference point	Overfished, overfishing not occurring: Atlantic halibut, Atlantic wolffish, ocean pout	Overfished, overfishing occurring: Gulf of Maine and Georges Bank Atlantic cod, northern windowpane flounder, witch flounder, Cape Cod-Gulf of Maine yellowtail flounder, Georges Bank yellowtail flounder, thorny skate

Table 10 – Baseline status of managed species, details

Northeast multispecies FMP - large mesh species	
Species	**Status and trends**
Acadian redfish	Not overfished, overfishing not occurring. Biomass and recruitment are increasing.
American plaice	Not overfished, overfishing not occurring. Biomass is increasing but recent recruitment has been low.
Atlantic cod	Gulf of Maine and Georges Bank stocks: Overfished, overfishing occurring. Recent biomass and recruitment estimates are low.
Atlantic halibut	Overfished, less than 10% of target. Overfishing is not occurring, and fishing mortality rates are very low.
Atlantic wolffish	Overfished, but overfishing not occurring. Recent recruitment slightly below average, biomass very low.
Haddock	Gulf of Maine: not overfished, but overfishing is occurring. Declining biomass and high fishing mortality rate. Georges Bank: not overfished, overfishing not occurring. Record high recruitment in 2010.
Ocean pout	Overfished, but overfishing is not currently occurring.
Pollock	Not overfished, overfishing not occurring. Recently below average recruitment but above average biomass estimates.
White hake	Not overfished, overfishing not occurring. Recent recruitment and biomass slightly below average.
Windowpane flounder	Northern stock: overfished, and overfishing is occurring; but fishing mortality down and biomass up between last two assessments. Southern stock: not overfished, overfishing not occurring; which represents a status change since the previous assessment.
Winter flounder	Gulf of Maine: status unclear, but overfishing probably not occurring; spawning stock biomass increased between 2003-2009, but current recruitment is low. Georges Bank: not overfished with overfishing not occurring; increases in both biomass and recruitment and decreases in fishing mortality. Southern New England/Mid-Atlantic: overfished, but overfishing not occurring; recent low landings, recruitment, and spawning stock biomass.
Witch flounder	Overfished with overfishing occurring. High recent recruitment with slight increases in spawning stock biomass.
Yellowtail flounder	Cape Cod/Gulf of Maine: overfished with overfishing occurring. Little change in biomass, decreasing recruitment, but decrease in fishing mortality. Southern New England/Mid-Atlantic: overfishing not occurring; conflicting biomass estimates but likely not overfished. Georges Bank: overfished with overfishing occurring. Fishing mortality rates are increasing and biomass is decreasing.
Northeast multispecies FMP – small mesh species	
Species	**Status and trends**
Red hake	Northern and southern stocks: Neither is overfished, and overfishing is not occurring, although the status of northern red hake may change when the stock assessment is updated in 2014.
Offshore hake	No status determination due to lack of data.
Silver hake	Northern and southern stocks: Neither is overfished, and overfishing is not occurring.
Monkfish FMP	
Species	**Status and trends**

Monkfish	Northern and southern stocks: recent three assessments suggest they are not overfished with overfishing not occurring, but considerable uncertainty in the assessments.
Skates FMP	
Species	**Status and trends**
Smooth skate	Not overfished, overfishing not occurring.
Thorny skate	Overfished with overfishing occurring; biomass appears to be declining.
Barndoor skate	Not overfished, overfishing not occurring.
Little skate	Not overfished, overfishing not occurring.
Winter skate	Not overfished, but overfishing is occurring.
Clearnose skate	Not overfished, overfishing not occurring.
Rosette skate	Not overfished, overfishing not occurring.
Atlantic sea scallop FMP	
Species	**Status and trends**
Atlantic sea scallop	Not overfished, overfishing not occurring, but fishing mortality in 2009 was equal to the threshold value.
Atlantic herring FMP	
Species	**Status and trends**
Atlantic herring	Not overfished, overfishing not occurring.
Deep-sea red crab FMP	
Species	**Status and trends**
Deep-sea red crab	Unknown stock status; data poor stock.
Surfclam and ocean quahog FMP	
Species	**Status and trends**
Surfclam	Not overfished, overfishing not occurring.
Ocean quahog	Not overfished, overfishing not occurring.
Bluefish FMP	
Species	**Status and trends**
Atlantic bluefish	Not overfished, overfishing not occurring.
Atlantic mackerel, squid, and butterfish FMP	
Species	**Status and trends**
Atlantic mackerel	Not overfished, overfishing not occurring; substantial uncertainty in assessment.
Butterfish	Status unknown. Overfishing not likely.

Shortfin squid	Status unknown, but recent catch indices and landings within typical ranges.
Longfin squid	Not overfished, overfishing determination not possible.
Spiny dogfish FMP	
Species	**Status and trends**
Spiny dogfish	Not overfished, overfishing not occurring. Rebuilt biomass as of 2010.
Summer flounder, scup, and black seabass FMP	
Species	**Status and trends**
Summer flounder	Not overfished, overfishing not occurring. Rebuilt as of 2011, with recent fishing mortality values fluctuating near the reference point.
Scup	Not overfished, overfishing not occurring; biomass approximately double the reference point.
Black sea bass	Not overfished, overfishing not occurring.
Golden tilefish FMP	
Species	**Status and trends**
Golden tilefish	Not overfished, overfishing not occurring. Rebuilt as of 2012.
Northern shrimp FMP	
Species	**Status and trends**
Northern shrimp	Collapsed; biomass has declined since 2007, and recruitment indices are poor.
American lobster FMP	
Species	**Status and trends**
American lobster	Gulf of Maine, Georges Bank, and Southern New England stocks: none are experiencing overfishing, but the Southern New England stock is overfished.

3.2.3 Human communities and the fishery

The various fisheries that are likely to be affected are described in Volume 1, Section 4.3. A summary is provided in Table 11 below. These include fisheries for large and small mesh Northeast multispecies, monkfish, skates, Atlantic sea scallops, Atlantic herring, deep-sea red crab, clams, bluefish, mackerel/squid/butterfish, dogfish, summer flounder/scup/black sea bass, tilefish, shrimp, and lobster. Recent fishery management plan actions should be consulted for detailed assessments of fishery status and communities affected. NMFS 2014 summarizes overall fisheries economics of the United States during 2012.

The status of these fisheries is mixed, with most fisheries relatively stable and others on the decline. Declining fishery conditions may be linked to poor stock conditions; this is the case with the Northeast Multispecies large-mesh fishery (some, but not all stocks at low abundance) and the northern shrimp fishery. In the monkfish fishery, landings have been on a downward trend, but monkfish catch limits do not appear to be the limiting factor. A number of other fisheries have stable landings that are below allocations (see below).

A "fishing community" is defined in the Magnuson-Stevens Act, as amended in 1996, as "a community which is substantially dependent on or substantially engaged in the harvesting or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community" (16 U.S.C. § 1802(17)). Fishing communities that are likely to be influenced by the alternatives in this amendment are listed Volume 1, Section 4.6 and Table 12 below. The specific communities of interest were identified through the economic analysis of vessel trips most likely to be impacted by the addition of new closed areas (see the economic impacts sections in Volume 3, Section 4.2.3, 4.3.3, and 4.4.3). Specifically these communities represent either the port of landing or city of registration for three or more vessels using mobile bottom-tending gears in 2012.

Depending on the status of their dominant fisheries, the associated communities may be on a positive, stable, or negative trajectory. Obviously many other factors contribute to community status besides fishery conditions; however the community indicator tables provided in Volume 1 provide an indication of which communities are most dependent on commercial and/or recreational fisheries. These communities include Chatham, Chilmark, and Gloucester, Massachusetts; Beals, Boothbay Harbor, Bremen, Bucks Harbor, Cundys Harbor, Friendship, Harpswell, Jonesport, Machiasport, New Harbor, Port Clyde, South Bristol, Stonington, Tenants Harbor, Vinalhaven, and Winter Harbor, Maine; Hobucken, Oriental, and Wanchese, North Carolina; Barnegat/Barnegat Light and Cape May, New Jersey; and Montauk, New York. Of these, Gloucester, MA is noteworthy because it is the only one of these communities where large-mesh groundfish was the primary species or species group by percentage of revenue in 2012.

Fishery management actions and stock status are assumed to be the major contributors to fishery status and associated community impacts, with protected resources management and non-fishing uses of the marine environment contributing incidentally to fishery and community baseline status. Some protected resource conservation measures negatively impact fishing operations, restricting the use of particular gear types during specific seasons and in specific areas. In some cases these regulations restrict use of a gear entirely, but in other instances there are gear modifications required only, such as vessel speed restrictions, pinger requirements for gillnets, or use of turtle excluder dredges in the scallop fishery.

Table 11 – Baseline status of fisheries

Fishery	Status and trends
Northeast multispecies large mesh fishery	Murphy et al. 2014 provides a summary of the economic performance of the Northeast multispecies fishery through the end of fishing year 2012 (April 2013). For all vessels with a valid limited access multispecies permit, gross nominal revenue from groundfish totaled nearly $70 million dollars, with 99% coming from sector vessels and 1% from the common pool. This total is lower than that for each of the 2009-2011 fishing years. Over this same period, average groundfish price per pound has increased, although this increase did not compensate for the decrease in landings, and non-groundfish revenues were not sufficient to make up the difference and overall revenues decreasesd amongst groundfish vessels. The number of active vessels has declined annually since 2009 to 764 in FY 2012. The number of trips and days absent decreased from FY 2011 to FY 2012.
Northeast multispecies small-mesh	The small mesh/whiting specifications will be updated this year (2014). A detailed update of the fishery trends was prepared for Amendment 19 to the Northeast Multispecies FMP (2012). Between 2002 and 2010, silver hake landings fluctuated between 5,000-8,000 mt, with landings around 8,000 mt ($11 million revenue) in 2010. About 25% of 2010 landings were from the northern area and the remaining landings were from the southern area. Offshore hake landings are very minor. Red hake are less commercially important, with between 400-900 mt landings over the same time period, and generally under $500,000 in revenue annually.
Monkfish	Landings in both the northern and southern areas combined have declined each year since FY2005, with the peak fishing year in FY2003, and were at the lowest level since the inception of the FMP in 1999. Monkfish landings increased between FY2002 and FY2003, principally due to the increase trip limits in the SMA but declined in FY2004 as trip limits and DAS allocations were reduced in that area. In FY2005 total landings increased by 1,272 mt, or about 7% due to an increase in SMA landings as a result of increased trip limits and DAS allocations, and in spite of a decline of 20% in NMA landings from the previous year. NMA landings have declined each year since FY2001, although trip limits were only established in FY2007, and in FY2008 were about 24% of what they were at the peak. The NMA is below the target TAL for FY2011 (63%) and FY2012 (67%); the SMA is also below the target TAL for FY2011 (65%) and FY2012 (58%).
Skate	The status of the skate fishery is summarized in Framework Adjustment 2 to the Northeast Skate Complex FMP (2014). The skate fishery caught 56% of the overall ACL in FY 2012; this was a decrease on FY 2011 landings. No AMs were triggered in FY 2012 as there was no overage. The wing fishery caught 70.5% of the wing TAL; the bait fishery caught 76.2% of the bait TAL. State landings in FY 2012 were 1,407 mt. Total discards in FY 2012 were 11,179 mt. Due to the relative absence of recreational skate fisheries, virtually all skate landings are derived from regional commercial fisheries. Commercial fishery landings never exceeded several hundred metric tons until the advent of distant-water fleets during the 1960s. Total skate landings have fluctuated between two levels between FY 2009 and 2012. The fluctuations in landings are largely attributable to the wing fishery as landings in the bait fishery have remained relatively stable. It is not clear what is driving the trend in wing landings as quota is not thought to be limiting to the fishery. One potential explanation is the decrease in winter skate survey index that suggests fewer winter skate were available to the fishery.

Fishery	Status and trends
Atlantic sea scallop	Framework 25 to the Atlantic Sea Scallop FMP (2014) summarizes current trends in the fishery. In the fishing years 2003-2011, the landings from the northeast sea scallop fishery stayed above 50 million pounds, surpassing the levels observed historically. The increase in the abundance of scallops coupled with higher scallop prices increased the profitability of fishing for scallops by the general category vessels. As a result, general category landings increased from less than 0.4 million pounds during the 1994-1998 fishing years to more than 4 million pounds during the fishing years 2005-2009, peaking at 7 million pounds in 2005 or 13.5% of the total scallop landings. The landings by the general category vessels (including limited access general category landings by LA vessels, and vessels with incidental and NGOM permits), declined after 2009 as a result of the Amendment 11 implementation that restricts TAC for the limited access general category fishery to 5.5% of the total ACL. However, the landings by limited access general category IFQ fishery increased in 2012 from its levels in 2010 due to a higher projected catch and a higher ACT for all permit categories. Total fleet revenues more than quadrupled in 2011 ($582 million) fishing year from its level in 1994 ($123 million, in inflation adjusted 2011 dollars). Scallop ex-vessel prices increased after 2001 as the composition of landings changed to larger scallops that in general command a higher price than smaller scallops. However, the rise in prices was not the only factor that led to the increase in revenue in the recent years compared to 1994-1998. In fact, inflation adjusted ex-vessel prices in 2008-2009 were lower than prices in 1994. The increase in total fleet revenue was mainly due to the increase in scallop landings and the increase in the number of active limited access vessels during the same period. Total scallop revenue for the fleet declined to $546 million in 2012 fishing year as a result of the drop in price and landings.
Atlantic herring	The current status of the herring fishery is summarized in the specifcations package submitted in 2013. Herring catches have been fairly consistent over the last ten years, increasing between 2011 and 2012 to 93,130 mt, down from a ten year high of 103,943 mt in 2009. In 2012 catch was slightly above the quota.
Deep-sea red crab	The current status of the red crab fishery is summarized in the specifications package submitted in 2014. 2010-2012 landings were lower than the TAL, and appeared to be consistent with average landings since 2002. Landings were grouped by three fishing regions based on VTR-reported statistical area fished, and landings by region indicated that the fishery has been operating nearly equally in all regions in recent years. LPUE appeared stable between 2010 and 2012 and showed an increasing trend since 2007.
Surfclam and ocean quahog	The Mid-Atlantic Fishery Management Council surfclam and ocean quahog AP information documents (2013) summarize the current status of the clam fisheries. The number of vessels fishing for surfclams has been fairly stable over the last 15 years, with a ten year high of 42 vessels in 2012. Prices for surfclams increased slightly in 2012, and the ex-vessel value of the federal surfclam harvest was approximately $28.4 million. Further expansion of the fishery on Georges Bank is likely in the near term. The number of vessels targeting quahogs both in the mid-Atlantic/southern New England and off the Maine coast has declined somewhat in recent years. In 2012, prices declined very slightly from 2011, but overall ex-vessel value of non-Maine landings increased about 10% to $22.9 million in 2012. The Maine fishery ex-vessel value was reported at $1.75 million in 2012 according to data from dealers, a 23% decrease from 2011.
Bluefish	The Mid-Atlantic Fishery Management Council Bluefish AP Information Document (2013) summarizes the current status of the fishery. Recreational landings peaked at 21 million pounds in 2007, and have declined recently to 11 million pounds in 2012, well below allocations. Commercial landings, which were also well below allocations in 2012, have been relatively stable and are less than half the recreational landings in recent years.

Fishery	Status and trends
Atlantic mackerel, squid, and butterfish	The Mid-Atlantic Fishery Management Council's AP information documents (2013) summarize the current status of these fisheries. Mackerel landings have declined since the mid-2000s, and were under 10,000 mt in 2012 (valued about about $4 million). Ex-vessel prices have increased. Twenty percent or less of the quota has been landed since 2008. Illex squid landings have generally been increasing since the mid-2000s, and were just over 10,000 mt in 2012, however price and ex-vessel value declined between 2011 and 2012. Longfin squid landings have shown a general downward trend since the early 1990s, but have increased in the past few years to between 10-15 million pounds in 2012. Price has increased over time. Butterfish landings have been fairly flat since the early 2000s, below 1000 mt annually. CPI-adjusted price has generally fallen since the late 1980s. Butterfish landings were well below the quota in 2012.
Spiny dogfish	The Mid-Atlantic Fishery Management Council Spiny Dogfish AP Information Document (2013) summarizes the current status of the dogfish fishery. Toward the end of the federal rebuilding schedule that ended in 2010, substantial increases in stock biomass allowed for an increase in the federal quota in 2009 to 12 M lb while still maintaining the rebuilding fishing mortality rate. US landings increased annually between 2003 and 2011, and value has increased over the same period to a high of approximately $4.5 million in 2011.
Summer flounder, scup, and black seabass	The Mid-Atlantic Fishery Management Council's APinformation documents (2013) summarize the current status of these fisheries. All three have a significant recreational and commercial component. Both commercial and recreational summer flounder landings have been fairly flat over the past 10 years, totaling 13.31 million pounds and 6.29 million pounds, respectively, in 2012. Prices and ex-vessel revenues in the commercial fishery have increased recently. For scup, recreational landings have been relatively flat in recent years, but commercial landings have increased to about 19.9 million pounds in 2012 (2012 recreational landings were approximately 4.17 million pounds). Black sea bass landings are similar across the recreational and commercial fisheries, and have fluctuated between 3 and 8 million pounds over the past 30+ years. Commericial landings have increased since 2009 and were 1.7 million pounds in 2012. Prices have been increasing since the mid-1990s and thus ex-vessel values have increased since 2009 along with landings. Recreational landings decreased in 2011 but increased in 2012 to over 3 million pounds.
Golden tilefish	The Mid-Atlantic Fishery Management Council Golden Tilefish AP Information Document (January 2013) summarizes the current status of the tilefish fishery. Since 2001, golden tilefish landings have ranged from 1.6 (2007) to 2.7 (2004) million pounds. With the exception of FY 2003, 2004, and 2010 commercial tilefish landings have been below the commercial quota specified each year since the Tilefish FMP was first implemented. Commercial tilefish ex-vessel revenues have ranged from $2.5 to $5.6 million for the 1999 through 2011 period, generally rising during this time period.
Northern shrimp	The northern shrimp fishery is seasonal, targeting female shrimp when they come inshore to spawn. When the annual total allowable catch has been harvested, the fishery closes. Both the 2009/2010 and 2010/2011 seasons were relatively short (156 days and 90 days, respectively). Delays in reporting landings resulted in short notice of the early closures during these seasons, and the total allowable catches were exceeded in both years. As a result, Amendment 2 implemented trip limits, trap limits, and days out of the fishery, in an effort to slow down catch rates and extend the season. Despite these changes, the 2011/2012 season was also brief, opening on January 2, 2012 for trawls and February 1 for traps, and closing on February 17. The most recent assessment indicates collapse of the stock, and future prospects look bleak. In December 2013, the Commission's Northern Shrimp Section approved a moratorium for the 2014 northern shrimp fishing season.
American lobster	Landed revenes for American lobster increased between 2009 and 2011 from $310 million to $423 million dollars. Landings were approximately 100-125 million pounds over that same period.

Table 12 – Fishing communities potentially affected by this amendment. Blank cells at the community level indicate data omitted due to confidentiality requirements.

State	2012 Landings		
Community	Value	Lbs	Top species/species groups landed
Connecticut	**$ 21,432,347**	**8,381,236**	
New London	$ 7,138,598	3,578,601	Scallops; mackerel, squid, butterfish; small mesh groundfish; monkfish
Stonington	$ 12,126,105	3,674,200	Scallops; summer flounder, scup, black sea bass; mackerel, squid, butterfish
Massachusetts	**$ 613,057,787**	**275,652,568**	
Barnstable	$ 8,647,609	1,426,395	Other; lobster; scallops; summer flounder, scup, black sea bass
Boston	$ 18,726,770	11,520,973	Large mesh groundfish; lobster; other
Chatham	$ 16,648,927	10,726,709	Other; scallops; lobster; large mesh groundfish
Chilmark	$ 1,267,709	251,199	Other; lobster; summer flounder, scup, black sea bass; large mesh groundfish
Fairhaven	$ 25,065,515	7,096,357	Scallops; other; lobster
Falmouth	$ 1,489,220	312,974	Other; summer flounder, scup, black sea bass; bluefish
Gloucester	$ 56,758,715	77,398,771	Large mesh groundfish; lobster; herring; scallops
Harwichport	$ 3,423,954	955,996	Other; lobster; scallops
Hyannis	-	-	-
Marshfield	$ 2,681,211	2,502,469	Lobster; large mesh groundfish; scallops
Mattapoisset	$ 319,379	195,054	Summer flounder, scup, black sea bass; other; ; large mesh groundfish
Nantucket	$ 2,712,606	449,624	Other; summer flounder, scup, black sea bass; lobster
New Bedford	$ 407,366,943	133,902,861	Scallops; large mesh groundfish; surfclam, ocean quahog; lobster
Newburyport	$ 924,924	288,756	Lobster; other; large mesh groundfish
Plymouth	$ 4,031,312	1,821,381	Lobster; other; mackerel, squid, butterfish
Provincetown	$ 6,108,947	1,890,793	Scallops; lobster; other; large mesh groundfish
Rockport	$ 796,794	230,669	Lobster; other
Sandwich	-	-	-
Salisbury	$ 5,524,274	2,791,940	Lobster; other; scallops; large mesh groundfish
Scituate	$ 4,519,702	3,253,876	Lobster; large mesh groundfish; dogfish; scallops
Woods Hole	$ 2,771,733	1,352,844	Mackerel, squid, butterfish; summer flounder, scup, black sea bass; other; large mesh groundfish
Maine	**$ 529,559,487**	**288,302,577**	
Beals	$ 11,463,226	5,035,395	Lobster; other; scallops
Boothbay Harbor	$ 4,663,088	1,710,569	Lobster; other; large mesh groundfish
Cundys Harbor	-	-	-
Friendship	$ 14,179,324	5,816,154	Lobster; other
Harpswell	$ 17,986,181	6,710,242	Lobster; other; large mesh groundfish
Jonesport	$ 12,696,660	17,800,984	Lobster; other; surfclam, ocean quahog
New Harbor	$ 3,727,306	1,794,881	Lobster
Port Clyde	$ 9,625,855	6,075,059	Lobster; other; large mesh groundfish
Portland	$ 33,565,377	58,643,014	Lobster; other; herring; large mesh groundfish
Rockland	$ 14,754,927	35,154,608	Herring
Saco	$ 436,456	378,490	Lobster; large mesh groundfish; other

State	2012 Landings		
Community	**Value**	**Lbs**	**Top species/species groups landed**
South Bristol	$ 6,204,061	3,290,724	Lobster; other; herring
Stonington	$ 47,217,453	22,232,499	Lobster; other; herring; scallops
Vinalhaven	$ 28,291,930	13,446,137	Lobster; other
Wells	-	-	-
North Carolina	**$ 30,845,218**	**20,597,665**	
Beaufort	$ 4,809,443	2,352,085	Other; summer flounder, scup, black sea bass
New Hampshire	**$ 23,261,842**	**11,414,633**	
Portsmouth	$ 5,674,278	2,753,325	Lobster; large mesh groundfish; other
Rye	$ 2,084,685	1,834,168	Large mesh groundfish; lobster; other
Seabrook	$ 2,346,150	1,879,911	Large mesh groundfish
New Jersey	**$ 192,128,847**	**240,210,579**	
Barnegat/Barnegat Light	$ 30,010,778	6,443,562	Scallops; other; monkfish
Cape May	$ 74,866,105	74,271,810	Scallops; mackerel, squid, butterfish; other; summer flounder, scup, black sea bass
Point Pleasant	$ 28,675,177	25,066,710	Scallops; surfclam, ocean quahog; summer flounder, scup, black sea bass; lobster
New York	**$ 43,800,906**	**28,231,715**	
Montauk	$ 23,105,671	14,426,314	Mackerel, squid, butterfish; summer flounder, scup, black sea bass; tilefish; other
Rhode Island	**$ 78,513,456**	**81,241,913**	
Newport	$ 10,561,749	8,582,400	Lobster; scallops; other; skates
Point Judith/ Narragansett	$ 42,701,304	43,912,198	Mackerel, squid, butterfish; scallops; other; herring
Virginia	**$ 176,793,054**	**453,871,518**	
Chincoteague	$ 9,143,896	4,479,025	Other; summer flounder, scup, black sea bass
Hampton	$ 14,072,645	5,591,189	Summer flounder, scup, black sea bass; other; bluefish
Newport News	$ 31,083,344	5,527,009	Scallops; summer flounder, scup, black sea bass; other
Seaford	$ 19,457,920	2,025,932	-

3.2.4 Protected resources

Various protected resources overlap the New England region. The distribution and status of these species is described in detail in Volume 1, Section 4.9. In general, the various large whales and sea turtles that overlap the region are considered endangered under the Endangered Species Act. Some fish stocks including shortnose sturgeon, Atlantic sturgeon, and Atlantic salmon are also listed as endangered. Various small whale, dolphin, and pinniped species are protected by the Marine Mammal Protection Act.

In general, the status of protected resources is on a positive trajectory, with some exceptions. Nest count data for turtles suggest improvements in the status of these species since 2004 (see discussion in Volume 1, section 4.8.2, and TEWG 2009). Large whale assessments indicate general increases in the population sizes for these species, with slight increases in abundance for the most vulnerable of these animals, the North Atlantic Right Whale (again, see Volume 1, section 4.8.2, and Waring et al. 2013). Small cetacean and pinniped populations appear to generally be fairly stable or increasing in their abundance (Waring et al. 2013). The Atlantic

sturgeon was only recently listed under the Endangered Species Act and assessments of the status of various distinct population segments are ongoing. As noted in Volume 1 section 4.8.2.6, the trend in abundance of Atlantic salmon in the Gulf of Maine DPS has been low and either stable or declining over the past several decades.

Table 13 – Baseline status of protected resource species

Sea Turtles		
Species	**Status**	**Potentially affected by this action**
Leatherback sea turtle	Endangered	Yes; seasonal occurrence in SNE/MAB.
Kemp's ridley sea turtle	Endangered	Yes; seasonal occurrence in SNE/MAB.
Green sea turtle	Endangered[c]	Yes; seasonal occurrence in SNE/MAB.
Loggerhead sea turtle, *Northwest Atlantic DPS*	Threatened	Yes; seasonal occurrence in SNE/MAB.
Hawksbill sea turtle	Endangered	No
Cetaceans		
Species	**Status**	**Potentially affected by this action**
North Atlantic right whale	Endangered	Yes
Humpback whale	Endangered	Yes
Fin whale	Endangered	Yes
Sei whale	Endangered	Yes
Blue whale	Endangered	No
Sperm whale	Endangered	No
Minke whale	Protected	Yes
Long-finned pilot whale	Protected	Yes
Short-finned pilot whale	Protected	Yes
Risso's dolphin	Protected	Yes; but mostly along shelf edge and slope, uncommon bycatch species
Atlantic white-sided dolphin	Protected	Yes
Common dolphin	Protected	Yes
Spotted dolphin	Protected	Yes; but uncommon bycatch species
Bottlenose dolphin[a]	Protected	Yes; but uncommon bycatch species
Harbor porpoise	Protected	Yes
Pinnipeds		
Species	**Status**	**Potentially affected by this action**
Harbor seal	Protected	Yes; most common seal in area
Gray seal	Protected	Yes; second most common seal in area
Harp seal	Protected	Yes; but less common
Hooded seal	Protected	Yes; but less common
Fish		
Species	**Status**	**Potentially affected by this action**
Shortnose sturgeon	Endangered	No
Atlantic salmon	Endangered	No

Atlantic sturgeon		
Gulf of Maine DPS	Threatened	Yes
New York Bight DPS, Chesapeake Bay DPS, Carolina DPS & South Atlantic DPS	Endangered	Yes
Cusk	Candidate	No
Dusky shark	Candidate	No

[a] Bottlenose dolphin (*Tursiops truncatus*), Western North Atlantic coastal stock is listed as depleted.

[c] Green turtles in U.S. waters are listed as threatened except for the Florida breeding population which is listed as endangered. Due to the inability to distinguish between these populations away from the nesting beach, green turtles are considered endangered wherever they occur in U.S. waters.

3.3 Cumulative effects of the alternatives

This section summarizes the cumulative effects of the alternatives in this amendment for two different combination scenarios: No Action alternatives and preferred alternatives. Other action alternatives are also discussed. For these alternatives, the cumulative effects of some example combinations are described generally, and compared to the No Action and preferred scenarios. This section will be updated for the FEIS when the Council identifies final preferred alternatives, however this analysis provides sufficient baseline to judge the impacts of a range of potential alternatives that may be selected for adoption.

3.3.1 Essential Fish Habitat and Habitat Area of Particular Concern designations

The Essential Fish Habitat and Habitat Area of Particular Concern designation alternatives (Volume 2) are administrative in nature. From the Council's perspective, one purpose of the EFH and the HAPC designations is to provide a focus for the analysis of fishing impacts, and to highlight locations where restrictions on methods of fishing might be employed to meet objectives relative to specific species, including particular life stages. Another purpose of these designations is that they serve as a tool that can be used by the Council, and especially, by NMFS, when they engage in the EFH consultation process. While they do serve an important information and consultation purpose, the EFH and HAPC designations themselves are not associated with any restrictions on the timing or methods of fishing. Thus, the impacts of the designations relate to the applicability of the designations to the consultation process. More narrowly-defined designations are more easily relied upon when conducting EFH consultations as areas that should be the target of conservation actions. The cumulative effects of the three suites of EFH designation alternatives are summarized in Table 14.

Table 14 – Cumulative effects of EFH designation alternatives

Suite of alternatives	Cumulative impacts on the physical and biological environment and managed resources	Cumulative impacts on human communities and the fishery	Cumulative impacts on protected resources
No Action Alternatives – mostly relative abudance-based with some inshore/state data and estuarine data	When combined with other past, present, and future foreseeable actions, expected to have indirect, positive impacts through improvements to management and EFH consultation process. Magnitude of impacts is relatively small and the impacts are not significant as the designations are administrative in nature.	When combined with other past, present, and future foreseeable actions, expected to have indirect, positive impacts through improved management and conservation of fishery resources and their habitats. Magnitude of impacts is relatively small and the impacts are not significant as the designations are administrative in nature.	When combined with other past, present, and future foreseeable actions, expected to have no discernable impacts, as the designations were not developed with protected resource considerations in mind.
Preferred Alternatives – mostly developed using the relative abundance plus habitat considerations approach at the 75th or 90th percentile abudance level. Include inshore/state data for additional states and coverage of maps and details in text descriptions incorporate depth and temperature information.	When combined with other past, present, and future foreseeable actions, expected to have indirect, positive impacts through improvements to management and EFH consultation process. Relative to No Action, the preferred alternatives are collectively more specific, which should improve their use in the consultation process. They also include better coverage of nearshore habitats, where many federal projects are conducted that receive attention in the consultation process. Thus, the magnitude of positive impacts is larger than for the No Action Alternatives.	As above. Based on the rationale provided at left, the magnitude of positive impacts is likely to be larger than for the No Action Alternatives.	When combined with other past, present, and future foreseeable actions, expected to have no discernable impacts, as the designations were not developed with protected resource considerations in mind.
Other Alternatives	When combined with other past, present, and future foreseeable actions, expected to have indirect, slightly positive or slightly negative impacts relative to No	When combined with other past, present, and future foreseeable actions, expected to have indirect, slightly positive or slightly negative impacts relative to No	When combined with other past, present, and future foreseeable actions, expected to have no discernable impacts, as the designations were not developed with protected

	Action via influence on the EFH consultation process. Direction of impacts depends on the designation method (see below).	Action via influence on the EFH consultation process. Direction of impacts depends on the designation method (see below).	resource considerations in mind.

There are a range of non-preferred, action alternatives for EFH designations depending on the species. Considering alternatives developed using a particular method as a group, there could be greater or lesser positive impacts on the physical and biological habitat, managed species, and human communities VECs relative to No Action. The No Action and preferred alternative designations are typically based on relative abundance data at the 75th and 90th percentile levels of catch. In this amendment, the 25th and 50th percentile catches were also analyzed and map representations were developed for each. Compared to the 75th and 90th percentile maps, the non-preferred 25th and 50th percentile maps cover a smaller area where the highest survey catches occurred (the 25th percentile maps have the smallest areal coverage and the 90th percentile maps the largest). This may be viewed as a positive relative to either the No Action or the preferred designations, because it would focus management and conservation efforts on a smaller subset of habitats where the highest catches of each species have been observed historically. However, these narrower designations may miss important areas of occurrence for some species, which could have a negative impact if it limits the scope of conservation recommendations provided on a given project. Considering these two factors together, increased specificity but the chance of missing important areas, the 25th and 50th percentile modified abundance based and abundance plus habitat considerations maps probably have a slightly less positive impact than the preferred alternative designations. Because they include additional state survey information and more recent survey data as compared to the No Action designations, these alternatives are likely neutral relative to No Action. For a given catch percentile, the alternatives that include habitat considerations have more positive impacts relative to the alternatives based on abundance only, because they limit the designations to appropriate depths and temperatures, and are therefore less likely to have EFH map coverages in locations not suitable for a particular species.

The species range designation alternatives are more general in nature and broadly cover any areas where the species was caught in the NEFSC trawl surveys, as well as inshore areas where the species was caught in more than 10% of tows, or estuarine areas where the species was identified as common or abundant. Because these designations are non-specific, they are less useful for helping to target recommended conservation measures. However, habitats used by a particular species and lifestage are unlikely to be missed by the species range alternatives. On balance, the species range designations probably provide slightly less positive impacts relative to No Action, and especially relative to the preferred alternative designations.

The No Action HAPC designations include an HAPC for Atlantic salmon in select rivers along the coast of Maine, and an HAPC for juvenile cod on the northern edge of Georges Bank. Collectively, the preferred alternatives maintain these HAPCs, and designate additional HAPCs. These additional designations are expected to have indirect positive impacts on the consultation and fishery management process relative to the No Action designations alone with respect to the biological habitat, managed species, and human communities VECs. Because there are no direct management implications of the HAPC designations, these impacts are not expected to be

substantial in magnitude. No additional cumulative impacts on the protected resources VEC beyond the baseline are expected to result from the HAPCs. The Atlantic salmon HAPC when combined with other conservation measures specific to Atlantic salmon (dam removals, etc.) is expected to have positive cumulative impacts.

3.3.2 Spatial management alternatives

In contrast with the EFH and HAPC designation alternatives, the spatial management alternatives (Volume 3) affect the types of fishing activities that are authorized in specific management areas. Therefore, when considered both alone and cumulatively with other alternatives proposed in this amendment, many of these alternatives have substantial positive and negative impacts on many of the analyzed VECs. This section (1) summarizes the direct impacts by alternative and VEC, grouping the alternatives according to No Action alternatives, preferred alternatives, and other alternatives (i.e. action alternatives not identified as preferred), and (2) discusses how these direct impacts combine with other past, present, and future foreseeable actions to impact each VEC.

The impacts analysis tables use the symbols and color coding shown below. The detailed direct effects analysis on which these tables are based is provided in Volume 3, Section 4, and the magnitude qualifiers 'highly', 'moderately', and 'slightly' correspond with the qualifiers used in that volume. Note that even with respect to a single VEC, these summary statements may combine positive and negative effects into a single estimate of overall impact, such that the single estimates are an oversimplification of often multi-faceted analyses. In many cases, different short-term vs. long-term impacts are anticipated, especially in terms of economic and social impacts, where there may be short term effort displacements, but long term stock benefits and therefore economic and social benefits are expected. For this reason, the summary tables explicitly decompose short and long run human and community impacts.

It is important to note that the direct impacts analyses summarized in the tables below generally consider the baseline status of the VEC under consideration when a making a determination about the direction, and especially the magnitude, of an impact. For example, the status of large-mesh groundfish and other managed resources was taken into account when estimating the impacts of the management alternatives (and in some cases, when designing the management alternatives). For stocks in need of rebuilding, such as Atlantic cod, or thorny skate, the impacts determinations for alternatives that could positively or negatively impact these stocks tend to be fairly conservative, assuming that these stocks have less capacity to buffer against negative impacts. In contrast stocks at high abundance levels were expected to have a greater capacity to buffer against changes in fishing activity expected to result from the management alternatives and the magnitude determinations are expected to be slight.

Similarly, in terms of the economic impacts analysis, the magnitude of a positive or negative impact is generally related to the consideration of the fishery overall. A particular magnitude of potentially displaced revenues may constitute a slight impact in the context of one fishery and a moderate or high level of impact in another. In addition, impacts may be locally substantial, but only slightly positive or negative when considering the fishery as a whole.

It is not possible to decompose specifically how past and present actions described in section 3.1 above have shaped the baseline status of the managed resources and fisheries evaluated in this amendment. The relevant question, therefore, is whether the management actions proposed in this amendment and the likely future actions outside this amendment are expected to influence the trajectory of the VEC in question. In addition to summing the direct impacts across management alternatives, the discussion sections that follow the tables attempt to address this question. Given the number and diversity of current and future foreseeable management actions, these assessments are qualitative and highly uncertain.

Symbol	Meaning
+++	highly positive
++	moderately positive
+	slightly positive
0	neutral
-	slightly negative
--	moderately negative
---	highly negative
Negl	negligible
Unk	Unknown or uncertain

3.3.2.1 No action suite of alternatives

In combination, the No Action suite of alternatives includes existing year-round habitat and groundfish closed areas, rolling closures and seasonal closures, and the Gulf of Maine Cod Spawning Protection Area (Table 15, Map 1). These management areas and the fishing restriction measures associated with each are described in detail in Volume 3, Section 2. Note that No Action is always Alternative 1 in any particular sub-regional or regional section of the document.

The impacts of the No Action alternatives range from highly negative to positive across the various VECs, with neutral impacts for many resources and fisheries other than groundfish, with the exception of some positive impacts on the skate resource and some slight positive and negative impacts on other resources and fisheries (Table 15). This table is a vast oversimplification of a detailed direct effects analysis, and glosses over contrasting short vs. long term effects, and well as over heterogeneous impacts between individual fish stocks. Detailed impacts analyses are provided in Volume 3, Section 4.

Table 15 – No Action spatial management alternatives

Alt. type	Sub-region or region	#	Areas included	Fishing restriction options
Habitat	Eastern Gulf of Maine	1	None	None
Habitat	Central Gulf of Maine	1	Jeffreys Bank Habitat Closure Area, Cashes Ledge Habitat Closure Area, Cashes Ledge Closed Area	Current measures
Habitat	Western Gulf of Maine	1	Western Gulf of Maine Habitat Closure Area, Western Gulf of Maine Closed Area	Current measures
Habitat	Georges Bank	1	Closed Areas I and II Habitat Closure Areas, Closed Areas I and II	Current measures
Habitat	Great South Channel/ Southern New England	1	Nantucket Lightship Habitat Closure Area, Nantucket Lightship Closed Area	Current measures
Spawning	Gulf of Maine	1	Western Gulf of Maine Closure Area, Cashes Ledge Closure Area, sector rolling closures, common pool rolling closures, Gulf of Maine Cod Spawning Protection Area	Current measures
Spawning	Georges Bank/Southern New England	1	Closed Areas I and II, Nantucket Lightship Closed Area, Georges Bank May Seasonal Closure Area	Current measures
Research	All	1	No DHRAs designated	None

Map 1 – No Action spatial management alternatives

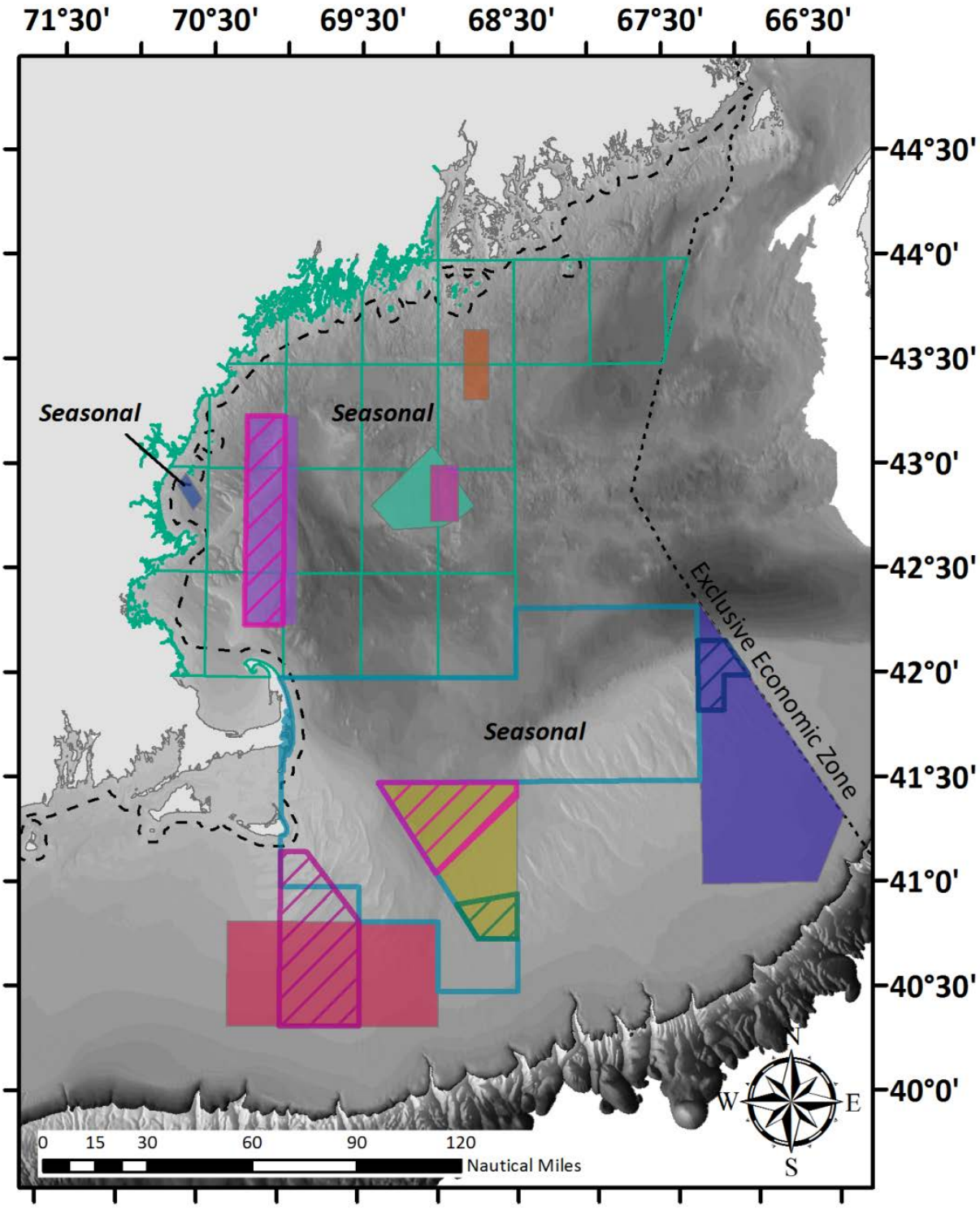

Table 16 – Impacts of the No Action spatial management alternatives. The upper panel summarizes overall habitat, economic, social, and protected resources impacts, plus impacts on NEFMC fisheries/species; the lower panel summarizes impacts on species and fisheries managed by MAFMC or ASMFC.

Type	Sub-region/ region	Alt	Habitat	Large mesh res.	Economic short-term	Economic long-term	Social short-term	Social long-term	Protected res.	Small mesh res.	Small mesh fishery	Monkfish res.	Monkfish fishery	Skate res.	Skate fishery	Sea scallop res.	Sea scallop fishery	Herring res.	Herring fishery	Red crab res.	Red crab fishery
Habitat	EGOM	1	-	-	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0
Habitat	CGOM	1	+++	+	+	+	0	0	0	-	0	0	0	+	-	0	0	0	0	0	0
Habitat	WGOM	1	+++	+	++	++	0	0	0	-	0	0	0	++	0	0	0	+	0	0	0
Habitat	GB	1	++	++	---	---	0	0	0	0	0	0	0	+	-	0	-	+	0	0	0
Habitat	GSC-SNE	1	-	0	--	--	0	0	0	0	0	0	0	0	-	0	0	+	0	0	0
Spawn.	GOM	1	-	++	++	++	-	-	Negl	Unk	0	0	0	+	-	0	0	+	-	0	0
Spawn.	GB-SNE	1	-	++	--	--	-	+	0	Unk	0	0	0	++	-	0	0	+	-	0	0
Res.	n/a	1	--	-	0	0	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0

Type	Sub-region/ region	Alt	Clam res.	Clam fishery	Bluefish res.	Bluefish fishery	M/S/B res.	M/S/B fishery	Dogfish res.	Dogfish fishery	SF/SC/BSB res.	SF/SC/BSB fishery	Tilefish res.	Tilefish fishery	Shrimp res.	Shrimp fishery	Lobster res.	Lobster fishery
Habitat	EGOM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habitat	CGOM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habitat	WGOM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habitat	GB	1	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0
Habitat	GSC-SNE	1	0	-	0	0	0	0	0	0	+	-	0	0	0	0	0	0
Spawn.	GOM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spawn.	GB-SNE	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Res.	n/a	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

The No Action habitat management alternative in the eastern Gulf of Maine sub-region is different from other no action alternatives in that it does not include any management alternatives. Impacts of this alternative are neutral to slightly negative across all VECs, mainly due to lost potential for benefits under the various action alternatives. Aside from the eastern Gulf of Maine, the various No Action habitat management alternatives in combination have a positive impact on seabed habitats, large mesh groundfish resources and habitats, and the skate resource. Because these alternatives represent the status quo, social impacts are generally neutral. Protected resource impacts are also neutral across this suite of alternatives.

Collectively, the alternatives have some locally positive effects on the herring and summer flounder resources via protection of the benthic habitats for these species from mobile-bottom tending gears. For herring, these are egg bed habitats as other lifestages are pelagic. There are some locally negative fishery impacts associated with these alternatives due to lost opportunities for additional exemption programs in the small mesh fishery, gear restrictions that affect the skate and summer flounder fisheries, closure of some scallop beds on Georges Bank that limit the scallop fishery, monitoring requirements associated with the Georges Bank groundfish closures that affect the herring fishery, and closure of clam fishing grounds on Nantucket Shoals.

The impacts of not designating any dedicated habitat research areas are generally negative to neutral, resulting from lost opportunities to study habitat and groundfish resource impacts of fishing.

The most heterogeneous impacts are economic, and these range from highly negative for the Georges Bank habitat alternative to positive for the western and, to a lesser extent, central Gulf of Maine habitat alternatives, and for the Gulf of Maine spawning alternatives. In general the No Action areas are expected to provide positive benefits for the groundfish fishery via continued protection of groundfish stocks, a number of which are depleted, but in areas where opportunities where fishing for scallops or clams are foregone due to existing closures, impacts are estimated to be negative to highly negative overall. However, present and future foreseeable fishery management actions outside this amendment that are directed towards rebuilding depleted groundfish stocks will hopefully provide additional positive impacts for those resources and the fisheries and fishing communities that use them. Fishery management actions in the Atlantic sea scallop and surfclam and ocean quahog plans will continue to provide opportunities to harvest these stocks, even if no action is taken in this amendment to adjust management areas and the current management areas lead to foregone harvest opportunites.

Cumulatively, some present and foreseeable future actions outside this amendment are likely to produce positive impacts on the physical and biological environment, managed resources, and human communities. For example, ongoing habitat restoration activities such as dam removals are expected to produce positive impacts for managed resources and the communities they support, even if no action is taken in this amendment.

Because direct impacts on protected resources are generally neutral, the No Action alternatives in this amendment are not expected to influence the overall trends in this VEC (positive mammals and turtles, more negative for sturgeon and salmon).

3.3.2.2 Preferred suite of alternatives

The preferred suite of alternatives combines both No Action and action alternatives for habitat protection, spawning protection, and research (Table 17, Map 2). These alternatives and the fishing restriction options associated with each management area are described in detail in Volume 3, Section 2. Briefly, Option 1 is closure to mobile bottom-tending gears and Option 5 is closure to gears capable of catching groundfish.

Importantly, note that the Council has not selected any preferred habitat alternatives in the Georges Bank or Great South Channel/Southern New England sub-regions The structure of the management alternatives indicates that the Council should select one (or more) alternative per alternative category (habitat, spawning, research) and sub-region or region. In other words, for each of the No Action alternatives listed in Table 15 above, the Council should eventually select an alternative or alternatives (this could, of course, include selection of No Action). The lack of preferred alternatives in these sub-regions precludes a fully meaningful cumulative effects analysis here; in this draft EIS the range of impacts associated the Georges Bank and Great South Channel/Southern New England habitat alternatives will be described as a series of add-ons to those alternatives already identified as preferred. Given trade-offs associated positive and negative impacts across and within VECs, a simple ranking of these habitat alternatives is difficult and will depend on how the various VECs are valued by a particular reader or decision maker.

Because the Cashes Ledge Closure Area was not identified by the Council as a preferred habitat management alternative, it is likely that the intention was to exclude the area from the preferred spawning management alternative (it is included with both alternatives as written). However, the analyses in the amendment do include the Cashes Ledge Closure Area when evaluating the impacts of Gulf of Maine Spawning Alternative 1, because the intent was to capture in the impacts analysis all existing management areas that might affect groundfish spawning. As a year-round closure to many gears capable of catching groundfish, the Cashes Ledge Closure Area limits the catch of spawning fish within the closure, and also limits the influence of fishing on spawning activities occurring within the closure.

The impacts of the preferred alternatives range from negative to positive across the various VECs, with neutral impacts for many resources and fisheries other than groundfish, with the exception of some positive impacts on the skate resource and fishery, scallop resource and fishery, and negative impacts of one alternative on the herring fishery (Table 16). There are some slightly positive and negative impacts on other resources and fisheries as well. This table is a vast oversimplification of a detailed direct effects analysis and glosses over contrasting short vs. long term effects, and well as over heterogeneous impacts between individual fish stocks. Detailed impacts analyses are provided in Volume 3, Section 4.

Table 17 – Preferred spatial management alternatives

Alt. type	Sub-region or region	#	Areas included	Fishing restriction options
Habitat	Eastern Gulf of Maine	2	Large Eastern Maine HMA, Machias HMA	Options 1 and 5
Habitat	Central Gulf of Maine	4	Modified Jeffreys Bank EFH HMA, Modified Cashes Ledge EFH HMA, Ammen Rock HMA	Option 1, Ammen Rock closed to all fishing
Habitat	Western Gulf of Maine	1	Western Gulf of Maine Habitat Closure Area, Western Gulf of Maine Closed Area	Current measures
Habitat	Western Gulf of Maine	7a	Inshore Roller Gear Restricted Area	Trawl roller gear limited to 12 inches diameter
Habitat	Western Gulf of Maine	8	WGOM Shrimp Trawl Exemption Area	Shrimp trawls exempted from mobile bottom-tending gear closure
Spawning	Gulf of Maine	1	Western Gulf of Maine Closure Area, *Cashes Ledge Closure Area***, Sector rolling closures, common pool rolling closures, GOM Cod Spawning Protection Area	Current measures
Spawning	Georges Bank/ Southern New England	2b	Closed Areas I and II	Option 5 including recreational gears
Research	Eastern Gulf of Maine	2	Eastern Maine DHRA	Option 1
Research	Western Gulf of Maine	3b	Stellwagen DHRA and northern reference area	Options 1 and 5, recreational gears capable of catching groundfish in reference area only
Research	Georges Bank	4	Georges Bank DHRA	Option 1
Research	All	5	Applies to any DHRAs designated	DHRA sunsets after 3 years if not being used

** See discussion in text.

Map 2 – Preferred spatial management alternatives

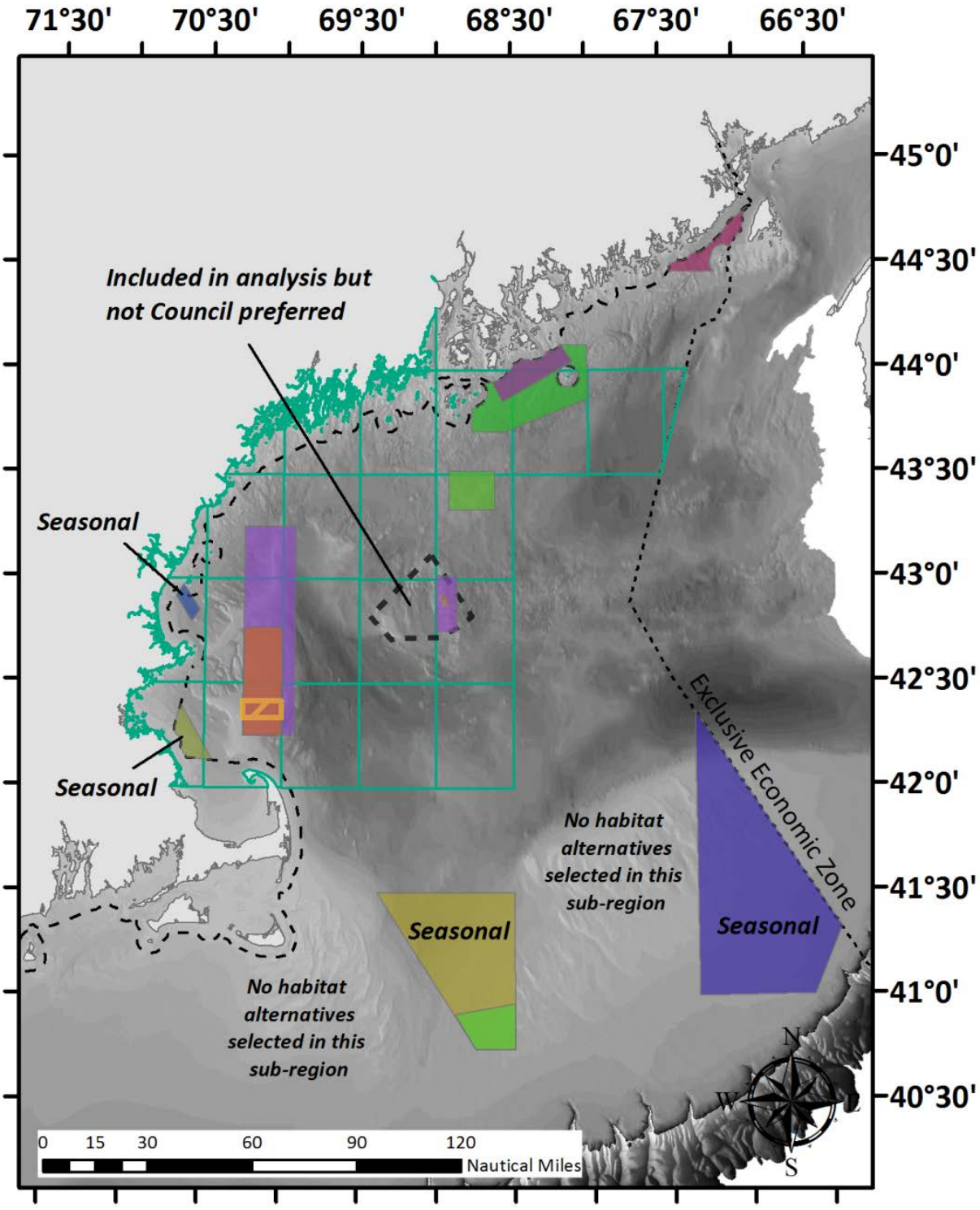

Table 18 – Impacts of the preferred spatial management alternatives. The upper panel summarizes overall habitat, economic, social, and protected resources impacts, plus impacts on NEFMC fisheries/species; the lower panel summarizes impacts on species and fisheries managed by MAFMC or ASMFC.

Type	Sub-region/ region	Alt	Habitat	Large mesh res.	Economic short-term	Economic long-term	Social short-term	Social long-term	Protected res.s	Small mesh res.	Small mesh fishery	Monkfish res.	Monkfish fishery	Skate res.	Skate fishery	Sea scallop res.	Sea scallop fishery	Herring res.	Herring fishery	Red crab res.	Red crab fishery
Habitat	EGOM	Alt. 2 Opt. 1, 2, 5	+	++	-	+	-	+	0	+	0	0	0	+	0	0	0	+	--	0	0
Habitat	CGOM	Alt. 4 Opt. 1 and 2	++	-	+	-	-	-	-	-	0	0	0	-	+	0	+	0	0	0	0
Habitat	WGOM	Alt. 1	+++	+	++	++	0	0	0	-	0	0	0	++	0	0	0	+	0	0	0
Habitat	WGOM	Alt. 7A	+	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0	0	0	0
Habitat	WGOM	Alt. 8	0	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spawn.	GOM	Alt. 1	-	++	++	++	-	-	Negl	Unk	0	0	0	+	-	0	0	+	-	0	0
Spawn.	GOM	Alt. 3	-	++	-	+	-	-	Negl	Unk	0	0	0	+	0	0	0	-	+	0	0
Spawn.	GB-SNE	Alt. 2B	+	+	+	+	+	+	-	Unk	0	0	0	-	+	++	++	-	+	0	0
Res.	EGOM	Alt. 2	++	++	-	+	0	0	Negl	+	0	0	0	+	0	0	0	0	0	0	0
Res.	WGOM	Alt. 3B	++	++	-	+	-	+	Negl	0	0	0	0	+	++	0	0	0	0	0	0
Res.	GB	Alt. 4	++	+	-	+	+	+	Negl	0	0	0	0	+	+	0	0	0	0	0	0
Res.	n/a	Alt. 5	0	+	0	+	++	++	Negl	0	0	0	0	0	0	0	0	0	0	0	0

Type	Sub-region/ region	Alt	Clam res.	Clam fishery	Bluefish res.	Bluefish fishery	M/S/B res.	M/S/B fishery	Dogfish res.	Dogfish fishery	SF/SC/B SB res.	SF/SC/B SB fishery	Tilefish res.	Tilefish fishery	Shrimp res.	Shrimp fishery	Lobster res.	Lobster fishery
Habitat	EGOM	Alt. 2 Opt. 1, 2, 5	0	-	0	0	0	0	0	0	0	0	0	0	0	0	+	0
Habitat	CGOM	Alt. 4 Opt. 1 and 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habitat	WGOM	Alt. 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habitat	WGOM	Alt. 7A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habitat	WGOM	Alt. 8	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0	0
Spawn.	GOM	Alt. 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spawn.	GOM	Alt. 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spawn.	GB-SNE	Alt. 2B	0	0	0	+	0	+	0	+	-	+	0	0	0	0	-	-
Res.	EGOM	Alt. 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Res.	WGOM	Alt. 3B	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0
Res.	GB	Alt. 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Res.	n/a	Alt. 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

As noted previously, the preferred alternative scenario identified here does not include any selections for habitat management measures on Georges Bank or in the Great South Channel/Southern New England. For the preferred alternatives identified thus far, habitat, large mesh groundfish, economic, and social impacts summed together are slightly positive to positive. Exceptions include slightly negative impacts of the central Gulf of Maine habitat alternatives relative to no action, due to expected long term negative impacts on large mesh resources. There are also negative social impacts associated with the eastern Gulf of Maine preferred habitat alternative, which would restrict a fairly significant amount of purse seine fishing for herring, due to selection of Option 5, which would implement a closure to gear capable of catching groundfish. In general, Western Gulf of Maine Habitat Alternative 7A, which would define the current roller gear restriction as a habitat management area, is expected to have neutral impacts, and Alternative 8, which would exempt shrimp trawl vessels from the existing Western Gulf of Maine Habitat Closure Area is expected to have neutral to slightly positive impacts.

In some instances the overall positive direction of the impacts belies locally heterogeneous impacts across different fish stocks or fisheries. For example, Georges Bank spawning alternative 2B has positive impacts on species that spawn within Closed Areas I and II during the late winter and early spring, but negative impacts on species that spawn in those areas during other times of year because Closed Areas I and II would be changed from year-round to seasonal management areas. The Stellwagen DHRA (Alternative 3B) has slightly positive to positive impacts overall, but negative economic impacts on local recreational groundfishing. Cumulatively, other fishery management actions will influence the magnitude of these direct effects. For example, allocating higher large-mesh groundfish catch limits within the Northeast Multispecies FMP will mitigate negative economic and social impacts associated with area management, and lower catch limits could exacerbate negative impacts.

As above, cumulatively, some present and foreseeable future actions outside this amendment are likely to work synergistically with the alternatives proposed here to produce positive impacts on the physical and biological environment, managed resources, and human communities. For example, ongoing habitat restoration activities such as dam removals are expected to produce positive impacts for managed resources, in particular groundfish resources, and the communities they support.

Because direct impacts on protected resources are generally neutral or only slightly negative, the preferred alternatives in this amendment are not expected to influence the overall trends in this VEC (positive mammals and turtles, more negative for sturgeon and salmon).

A lack of preferred management alternatives in all categories precludes a complete consideration of cumulative effects at this time. The impacts of the Georges Bank and the Great South Channel/Southern New England habitat management alternatives are highly heterogeneous within and across VECs, and in many cases are strongly positive or negative. Thus, there could be changes in the overall trajectory of the cumulative effects depending on the habitat management alternatives selected for each region. In terms of habitat and large mesh groundfish impacts, removing habitat management areas on Georges Bank (Alternative 2) or designating only gear modification areas (Alternatives 3, 4, and 6, Options 3 and 4, and Alternative 5) would have highly negative or negative impacts (see the following section for summary tables).

Conversely, these same alternatives tend to have positive economic impacts, as they increase flexibility and provide fishing opportunites, at least in the short-term and especially for the scallop fishery, although these positive benefits are tempered by negative expected outcomes for groundfish in the long-term. From an overall habitat perspective, many of the Georges Bank alternatives that restrict mobile bottom-tending gears have slightly positive or positive impacts (Alternatives 3, 4, 6A, 7, and in particular, Alternative 8). These generally do not have positive benefits for groundfish resources though, and some alternatives have negative economic impacts overall due to displacement of scallop or clam fishing effort, or due to the areas continuing to encompass scallop aggregations that are currently off limits to fishing.

Final decisions on the Great South Channel/Southern New England habitat measures will have a smaller influence on the overall direction of cumulative effects because the impacts are less significant overall. In general, habitat and groundfish impacts are expected to be neutral to slightly positive, with the most positive benefits associated with Alternative 3. However, Alternative 3 also has the largest magnitude of negative economic impacts as it would displace the most revenue of any alternative in the sub-region. Other alternatives also have negative impacts, which generally affect the clam fishery, although scallop effort would also be displaced by Alternative 3, and the eastern edge of the Great South Channel East HMA in Alternative 3 contains significant biomass relative to the scallop resource as a whole.

3.3.2.3 Other alternatives under consideration

In addition to the No Action and preferred alternatives, many other management areas and measures are under consideration in this action (Table 19). Full descriptions of the alternative areas and fishing restriction options are provided in Volume 3, Section 2. In addition to Options 1 and 5 described in the previous section, Option 2 would be a mobile bottom-tending gear restriction with an exemption provided for hydraulic clam dredges, and Options 3 and 4 would require specific ground cable lengths and configurations on bottom trawls. Due to the large number of areas, these other alternatives are very difficult to display on a single map, but maps of each alternative are available in Volume 3, both in Section 2 and throughout the impacts analysis in Section 4.

Many of the alternatives within a region or sub-region consist of the same areas in different combinations (e.g. western Gulf of Maine habitat alternatives, spawning alternatives) or different but spatially overlapping areas (Georges Bank and Great South Channel/Southern New England habitat alternatives), such that the list below should not be viewed as a possible combination scenario. Developing such scenarios would be highly speculative in the absence of preferred alternative recommendations from the Council. Therefore, the potential range of cumulative impacts that might result from different combinations will be discussed generally in terms of where various alternatives fall on a continuum of impacts. As noted above, there are in some cases positive impacts for some VECs or components of VECs (i.e. specific species groups or fisheries) and negative impacts of the same alternative with respect to other VECs or components of VECs. This makes ranking very difficult and the reader is strongly encouraged to review the direct impacts analysis in Volume 3 for additional details about each alternative's impacts.

The impacts of the additional management alternatives under consideration range from highly negative to highly positive across the various VECs, which neutral impacts for many resources

and fisheries other than groundfish (Table 20). Positive impacts to the monkfish, skate, and scallop fisheries are associated with some alternatives, and negative impacts to the scallop, clam, and shrimp fisheries are associated with others. There are some slightly positive and negative impacts on other resources and fisheries as well. This table is a vast oversimplification of a detailed direct effects analysis and glosses over contrasting short vs. long term effects, and well as over heterogeneous impacts between individual fish stocks. Detailed impacts analyses are provided in Volume 3, Section 4.

Table 19 – Additional spatial management alternatives under consideration

Alt. type	Sub-region or region	#	Areas included	Fishing restriction options
Habitat	Eastern Gulf of Maine	3	Small Eastern Maine HMA, Machias HMA, Toothaker Ridge HMA	Options 1-4
Habitat	Central Gulf of Maine	2	None	None
Habitat	Central Gulf of Maine	3	Modified Jeffreys Bank EFH HMA, Modified Cashes Ledge EFH HMA, Ammen Rock HMA, Fippennies Ledge HMA, Platts Bank HMA	1-4, Ammen Rock closed to all fishing
Habitat	Western Gulf of Maine	2	None	None
Habitat	Western Gulf of Maine	3	Large Bigelow Bight HMA, Large Stellwagen HMA	Options 1-4
Habitat	Western Gulf of Maine	4	Large Bigelow Bight HMA, Small Stellwagen HMA, Jeffreys Ledge HMA	Options 1-4
Habitat	Western Gulf of Maine	5	Small Bigelow Bight HMA, Small Stellwagen HMA, Jeffreys Ledge HMA	Options 1-4
Habitat	Western Gulf of Maine	6	Large Stellwagen HMA	Options 1-4
Habitat	Western Gulf of Maine	7b	Alternate Roller Gear Restricted Area	Trawl roller gear limited to 12 inches diameter
Habitat	Georges Bank	2	None	None
Habitat	Georges Bank	3	Northern Edge HMA	Options 1-4
Habitat	Georges Bank	4	Northern Edge HMA and Georges Shoal Gear Modified Area	NE: 1-4, GS: 3-4
Habitat	Georges Bank	5	Georges Shoal 1 MBTG HMA and Northern Georges Gear Modified Area	GS: 1-2, NG: 3-4
Habitat	Georges Bank	6a	EFH Expanded 1 HMA	Options 1-4
Habitat	Georges Bank	6b	EFH Expanded 2 HMA	Options 1-4
Habitat	Georges Bank	7	Georges Shoal 2 MBTG HMA and EFH South MBTG HMA	Options 1-2
Habitat	Georges Bank	8	Northern Georges MBTG HMA	Options 1-2
Habitat	Great South Channel/ Southern New England	2	None	None
Habitat	Great South Channel/ Southern New England	3	Great South Channel East HMA and Cox Ledge HMA	Options 1-4
Habitat	Great South Channel/ Southern New England	4	Great South Channel HMA and Cox Ledge HMA	Options 1-4
Habitat	Great South Channel/ Southern New England	5	Nantucket Shoals HMA and Cox Ledge HMA	Options 1-4
Habitat	Great South Channel/Southern New England	6	Nantucket Shoals West MBTG HMA, Great South Channel Gear Modified Area, Cox Ledge HMA	NSW: 1-2, GSC: 3-4, CL: 1-4
Spawning	Gulf of Maine	2a	Sector rolling closures, GOM Cod Spawning Protection Area, Massachusetts Bay Cod Spawning Protection Area	Option 5 (recreational gears in GOM and MassBay Cod Spawning Protection Areas)

Spawning	Gulf of Maine	2b	Sector rolling closures, GOM Cod Spawning Protection Area, Massachusetts Bay Cod Spawning Protection Area	Option 5 including recreational gears
Spawning	Gulf of Maine	3	Massachusetts Bay Cod Spawning Protection Area	Option 5 including recreational gears
Spawning	Georges Bank/Southern New England	2a	Closed Areas I and II	Option 5
Spawning	Georges Bank/Southern New England	2c	Closed Areas I and II	Scallop dredges exempt from closure
Spawning	Georges Bank/Southern New England	3a	Closed Area I North and Closed Area II	Option 5
Spawning	Georges Bank/Southern New England	3b	Closed Area I North and Closed Area II	Option 5 including recreational gears
Spawning	Georges Bank/Southern New England	3c	Closed Area I North and Closed Area II	Scallop dredges exempt from closure
Research	Western Gulf of Maine	3a	Stellwagen DHRA and southern reference area	Options 1 and 5, recreational gears capable of catching groundfish in ref. area only
Research	Western Gulf of Maine	3c	Stellwagen DHRA (no reference area)	Options 1 and 5

Table 20 – Impacts of other spatial management alternatives under consideration. The upper panel summarizes overall habitat, economic, social, and protected resources impacts, plus impacts on NEFMC fisheries/species; the lower panel summarizes impacts on species and fisheries managed by MAFMC or ASMFC.

Type	Sub-region/ region	Alt	Habitat	Large mesh res.	Economic short run	Economic Long run	Social short term	Social long term	Protected res.s	Small mesh res.	Small mesh fishery	Monkfish res.	Monkfish fishery	Skate res.	Skate fishery	Sea scallop res.	Sea scallop fishery	Herring res.	Herring fishery	Red crab res.	Red crab fishery
Habitat	EGOM	Alt. 2 Opt. 3-4	Unk	0	-	-	-	-	0	-	0	0	0	0	0	0	0	+	0	0	0
Habitat	EGOM	Alt. 3 Opt. 1-2	++	++	-	+	-	+	0	+	0	0	0	+	0	0	0	+	0	0	0
Habitat	EGOM	Alt. 3 Opt. 3-4	Unk	0	-	-	-	-	0	-	0	0	0	0	0	0	0	+	0	0	0
Habitat	CGOM	Alt. 2 (No area)	---	--	+	-	+	-	-	-	0	0	0	-	+	0	+	0	0	0	0
Habitat	CGOM	Alt. 3 Opt. 1-2	+++	-	+	-	-	-	-	-	0	0	0	-	+	0	-	0	0	0	0
Habitat	CGOM	Alt. 3 Opt. 3-4	---	--	-	-	-	-	-	-	0	0	0	-	+	0	+	0	0	0	0
Habitat	CGOM	Alt. 4 Opt. 3-4	---	--	-	-	-	-	-	-	0	0	0	-	+	0	+	0	0	0	0
Habitat	WGOM	Alt. 2 (No area)	--	--	++	--	+	--	-	-	+	0	+	--	0	0	0	-	0	0	0
Habitat	WGOM	Alt. 3 Opt. 1-2	+++	+++	--	++	--	++	-	+	--	0	+	-	0	0	0	+	-	0	0
Habitat	WGOM	Alt. 3 Opt. 3-4	---	--	-	--	--	--	-	-	0	0	+	0	0	0	0	+	-	0	0
Habitat	WGOM	Alt. 4 Opt. 1-2	+++	+++	--	++	--	+	-	+	--	0	+	0	0	0	0	+	-	0	0
Habitat	WGOM	Alt. 4 Opt. 3-4	---	--	-	--	--	--	-	-	0	0	+	0	0	0	0	+	-	0	0
Habitat	WGOM	Alt. 5 Opt. 1-2	+++	++	--	++	--	+	-	+	-	0	+	0	0	0	0	+	-	0	0
Habitat	WGOM	Alt. 5 Opt. 3-4	---	--	-	--	-	-	-	-	0	0	+	0	0	0	0	+	-	0	0
Habitat	WGOM	Alt. 6 Opt. 1-2	--	-	+	-	+	-	-	-	Negl	0	+	-	0	0	0	-	0	0	0
Habitat	WGOM	Alt. 6 Opt. 3-4	---	--	-	--	-	--	-	-	+	0	+	-	0	0	0	-	0	0	0
Habitat	WGOM	Alt. 7B	+	+	0	0	0	0	0	+	0	0	0	0	0	0	0	0	0	0	0
Habitat	GB	Alt. 2 (No area)	--	---	+++	+++	++	--	-	0	+	0	++	-	+	0	+++	-	0	0	0
Habitat	GB	Alt. 3 Opt. 1	++	--	+++	++	++	--	-	0	0	0	++	-	++	0	-	+	0	0	0
Habitat	GB	Alt. 3 Opt. 2	++	--	+++	++	++	--	-	0	0	0	++	-	++	0	-	+	0	0	0
Habitat	GB	Alt. 3 Opt. 3-4	--	--	+++	++	++	--	-	0	0	0	++	-	++	0	+++	+	0	0	0
Habitat	GB	Alt. 4 Opt. 1	++	--	+++	++	++	--	-	0	-	0	++	-	++	0	-	+	0	0	0
Habitat	GB	Alt. 4 Opt. 2	++	--	+++	++	++	--	-	0	-	0	++	-	++	0	-	+	0	0	0
Habitat	GB	Alt. 4 Opt. 3-4	--	--	+++	++	++	--	-	0	-	0	++	-	++	0	+++	+	0	0	0
Habitat	GB	Alt. 5	--	--	++	++	-	-	-	0	-	0	++	-	++	0	+++	+	0	0	0
Habitat	GB	Alt. 6A Opt. 1	+++	-	--	---	--	--	-	0	0	0	++	-	++	0	--	+	0	0	0
Habitat	GB	Alt. 6A Opt. 2	+++	-	--	---	--	--	-	0	0	0	++	-	++	0	--	+	0	0	0
Habitat	GB	Alt. 6A Opt. 3-4	--	--	+++	+++	+	--	-	0	0	0	++	-	++	0	+++	+	0	0	0
Habitat	GB	Alt. 6B Opt. 1	-	---	+++	+++	++	--	-	0	0	0	++	-	++	0	+	+	0	0	0
Habitat	GB	Alt. 6B Opt. 2	-	---	+++	+++	++	--	-	0	0	0	++	-	++	0	+	+	0	0	0
Habitat	GB	Alt. 6B Opt. 3-4	--	---	+++	+++	+	--	-	0	0	0	++	-	++	0	+++	+	0	0	0
Habitat	GB	Alt. 7 Opt. 1-2	+	---	+++	+++	++	-	-	0	-	0	0	-	0	0	+++	+	0	0	0
Habitat	GB	Alt. 8 Opt. 2-2	+++	++	---	---	--	--	-	0	-	0	-	-	--	0	---	+	0	0	0
Habitat	GSC-SNE	Alt. 2 (No area)	+	-	+	+	+	-	-	0	Negl	0	+	0	+	0	0	-	0	0	0
Habitat	GSC-SNE	Alt. 3 Opt. 1	++	+	---	---	--	-	-	0	Negl	0	+	0	0	0	--	+	-	0	0

Type	Sub-region/ region	Alt	Habitat	Large mesh res.	Economic short run	Economic Long run	Social short term	Social long term	Protected res.s	Small mesh res.	Small mesh fishery	Monkfish res.	Monkfish fishery	Skate res.	Skate fishery	Sea scallop res.	Sea scallop fishery	Herring res.	Herring fishery	Red crab res.	Red crab fishery
Habitat	GSC-SNE	Alt. 3 Opt. 2	+	+	---	---	--	-	-	0	Negl	0	+	0	0	0	--	+	-	0	0
Habitat	GSC-SNE	Alt. 3 Opt. 3-4	0	Unk	++	++	+	+	-	0	Negl	0	+	0	0	0	0	+	-	0	0
Habitat	GSC-SNE	Alt. 4 Opt. 1	+	Unk	--	+	--	++	-	0	Negl	0	+	0	0	0	0	+	-	0	0
Habitat	GSC-SNE	Alt. 4 Opt. 2	+	Unk	++	-	+	++	-	0	Negl	0	+	0	0	0	0	+	-	0	0
Habitat	GSC-SNE	Alt. 4 Opt. 3-4	0	Unk	++	--	+	-	-	0	Negl	0	+	0	0	0	0	+	-	0	0
Habitat	GSC-SNE	Alt. 5 Opt. 1	+	Unk	-	+	--	++	-	0	Negl	0	+	0	0	0	0	+	-	0	0
Habitat	GSC-SNE	Alt. 5 Opt. 2	+	Unk	+	+	+	++	-	0	Negl	0	+	0	0	0	0	+	-	0	0
Habitat	GSC-SNE	Alt. 5 Opt. 3-4	0	Unk	+	--	+	-	-	0	Negl	0	+	0	0	0	0	+	-	0	0
Habitat	GSC-SNE	Alt. 6	0	Unk	--	--	--	--	-	0	Negl	0	+	0	0	0	0	+	-	0	0
Spawn.	GOM	Alt. 2A	-	++	+	-	0	0	Negl	Unk	0	0	0	-	+	0	0	-	+	0	0
Spawn.	GOM	Alt. 2B	-	++	+	-	-	-	Negl	Unk	0	0	0	-	+	0	0	-	+	0	0
Spawn.	GB-SNE	Alt. 2A	+	+	+	+	0	0	-	Unk	0	0	0	-	+	++	++	-	+	0	0
Spawn.	GB-SNE	Alt. 2C	+	+	+	+	+	+	Negl	Unk	0	0	0	-	+	0	0	-	+	0	0
Spawn.	GB-SNE	Alt. 3A	+	+	+	+	+	+	-	Unk	0	0	0	-	+	++	++	-	+	0	0
Spawn.	GB-SNE	Alt. 3B	+	+	+	+	+	+	-	Unk	0	0	0	-	+	++	++	-	+	0	0
Spawn.	GB-SNE	Alt. 3C	+	-	+	+	+	+	Negl	Unk	0	0	0	-	+	0	0	-	+	0	0
Res.	WGOM	Alt. 3A	++	++	-	+	+	+	Negl	0	0	0	0	+	++	0	0	0	0	0	0
Res.	WGOM	Alt. 3C	++	++	0	+	+	++	Negl	0	0	0	0	+	++	0	0	0	0	0	0

Type	Sub-region/ region	Alt	Clam res.	Clam fishery	Bluefish res.	Bluefish fishery	M/S/B res.	M/S/B fishery	Dogfish res.	Dogfish fishery	SF/SC/B SB res.	SF/SC/B SB fishery	Tilefish res.	Tilefish fishery	Shrimp res.	Shrimp fishery	Lobster res.	Lobster fishery
Habitat	EGOM	Alt. 2 Opt. 3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0
Habitat	EGOM	Alt. 3 Opt. 1-2	0	-	0	0	0	0	0	0	0	0	0	0	0	0	+	0
Habitat	EGOM	Alt. 3 Opt. 3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0
Habitat	CGOM	Alt. 2 (No area)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habitat	CGOM	Alt. 3 Opt. 1-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habitat	CGOM	Alt. 3 Opt. 3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habitat	CGOM	Alt. 4 Opt. 3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habitat	WGOM	Alt. 2 (No area)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0
Habitat	WGOM	Alt. 3 Opt. 1-2	0	0	0	0	0	0	0	0	0	0	0	0	0	---	+	0
Habitat	WGOM	Alt. 3 Opt. 3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0
Habitat	WGOM	Alt. 4 Opt. 1-2	0	0	0	0	0	0	0	0	0	0	0	0	0	---	+	0
Habitat	WGOM	Alt. 4 Opt. 3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+	0
Habitat	WGOM	Alt. 5 Opt. 1-2	0	0	0	0	0	0	0	0	0	0	0	0	0	--	+	0
Habitat	WGOM	Alt. 5 Opt. 3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	--	+	0
Habitat	WGOM	Alt. 6 Opt. 1-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habitat	WGOM	Alt. 6 Opt. 3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Type	Sub-region/ region	Alt	Clam res.	Clam fishery	Bluefish res.	Bluefish fishery	M/S/B res.	M/S/B fishery	Dogfish res.	Dogfish fishery	SF/SC/B SB res.	SF/SC/B SB fishery	Tilefish res.	Tilefish fishery	Shrimp res.	Shrimp fishery	Lobster res.	Lobster fishery
Habitat	WGOM	Alt. 7B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habitat	GB	Alt. 2 (No area)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-
Habitat	GB	Alt. 3 Opt. 1	0	-	0	0	0	0	0	0	+	0	0	0	0	0	-	-
Habitat	GB	Alt. 3 Opt. 2	0	0	0	0	0	0	0	0	+	0	0	0	0	0	-	-
Habitat	GB	Alt. 3 Opt. 3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-
Habitat	GB	Alt. 4 Opt. 1	0	-	0	0	0	0	0	0	+	0	0	0	0	0	-	-
Habitat	GB	Alt. 4 Opt. 2	0	0	0	0	0	0	0	0	+	0	0	0	0	0	-	-
Habitat	GB	Alt. 4 Opt. 3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-
Habitat	GB	Alt. 5	0	--	0	0	0	0	0	0	+	0	0	0	0	0	-	-
Habitat	GB	Alt. 6A Opt. 1	0	--	0	0	0	0	0	0	+	0	0	0	0	0	-	-
Habitat	GB	Alt. 6A Opt. 2	0	0	0	0	0	0	0	0	+	0	0	0	0	0	-	-
Habitat	GB	Alt. 6A Opt. 3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-
Habitat	GB	Alt. 6B Opt. 1	0	--	0	0	0	0	0	0	+	0	0	0	0	0	-	-
Habitat	GB	Alt. 6B Opt. 2	0	0	0	0	0	0	0	0	+	0	0	0	0	0	-	-
Habitat	GB	Alt. 6B Opt. 3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-
Habitat	GB	Alt. 7 Opt. 1-2	0	--	0	0	0	0	0	0	+	0	0	0	0	0	-	-
Habitat	GB	Alt. 8 Opt. 1-2	0	--	0	0	0	0	0	0	+	0	0	0	0	0	0	0
Habitat	GSC-SNE	Alt. 2 (No area)	0	++	0	0	0	+	0	0	0	0	0	0	0	0	0	0
Habitat	GSC-SNE	Alt. 3 Opt. 1	0	--	0	0	0	0	0	0	+	-	0	0	0	0	0	0
Habitat	GSC-SNE	Alt. 3 Opt. 2	0	0	0	0	0	0	0	0	+	-	0	0	0	0	0	0
Habitat	GSC-SNE	Alt. 3 Opt. 3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habitat	GSC-SNE	Alt. 4 Opt. 1	0	--	0	0	0	0	0	0	+	-	0	0	0	0	0	0
Habitat	GSC-SNE	Alt. 4 Opt. 2	0	0	0	0	0	0	0	0	+	-	0	0	0	0	0	0
Habitat	GSC-SNE	Alt. 4 Opt. 3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habitat	GSC-SNE	Alt. 5 Opt. 1	0	--	0	0	0	0	0	0	+	-	0	0	0	0	0	0
Habitat	GSC-SNE	Alt. 5 Opt. 2	0	0	0	0	0	0	0	0	+	-	0	0	0	0	0	0
Habitat	GSC-SNE	Alt. 5 Opt. 3-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habitat	GSC-SNE	Alt. 6	0	--	0	0	0	0	0	0	+	-	0	0	0	0	0	0
Spawn.	GOM	Alt. 2A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spawn.	GOM	Alt. 2B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spawn.	GB-SNE	Alt. 2A	0	0	0	+	0	+	0	+	-	+	0	0	0	0	-	-
Spawn.	GB-SNE	Alt. 2C	0	0	0	+	0	+	0	+	-	+	0	0	0	0	-	-
Spawn.	GB-SNE	Alt. 3A	0	0	0	+	0	+	0	+	-	+	0	0	0	0	-	-
Spawn.	GB-SNE	Alt. 3B	0	0	0	+	0	+	0	+	-	+	0	0	0	0	-	-
Spawn.	GB-SNE	Alt. 3C	0	0	0	+	0	+	0	+	-	+	0	0	0	0	-	-
Res.	WGOM	Alt. 3A	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0
Res.	WGOM	Alt. 3C	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0

Similar to the Georges Bank and Great South Channel/Southern New England habitat alternatives discussed in the previous section, the other management alternatives summarized in Table 20 have highly heterogeneous impacts within and across VECs, depending on the areas and fishing restriction measures selected. As noted above, a vast number of potential scenarios can be constructed from these alternatives. Combinations of alternatives could be developed from this range that would have positive or negative impacts overall, considering just the direct effects of the actions proposed in this amendment, and the cumulative effects of other present and future actions.

Note that the direction and magnitude of the economic and social impacts depends on the fisheries affected and the amount of effort potentially displaced by each set of management areas. In general, high value fishing for scallops and to a lesser extent clams tends to swamp the net impact determinations in areas where these fisheries are very important.

Generally speaking, the impacts on most Mid-Atlantic species and fisheries are neutral or slight, so the choice of alternatives should have limited impacts on these VECs. In these cases, ongoing management actions in these fisheries will have the greatest influence on cumulative effects on mid-Atlantic managed resources, fisheries, and fishing communities. A slight exception to this is that some of the Georges Bank and Great South Channel habitat alternatives are expected to have negative impacts on the clam fishery. While significant biological impacts on the clam resource are not expected, some of the habitat management areas identified encompass important clam fishing grounds, and the fishery appears likely to expand on Georges Bank in the coming years. While the bulk of the clam fishery is prosecuted outside New England, some of the alternatives proposed in this action could combine with other actions that clam fishery to produce negative cumulative effects.

There is also the potential for negative impacts on the shrimp fishery due to closure of some shrimp fishing grounds in the Gulf of Maine under western Gulf of Maine Alternatives 3, 4, and 5. While there is currently a moratorium in this fishery, these areas would be important to the fishery should it reopen in future seasons. Direct management of the shrimp fishery by the Commission is expected to have a far larger impact on that fishery and associated fishing communities than the alternatives in this amendment would have, but similar to the clam fishery discussion above, the alternatives proposed here could have a large influence on the shrimp fishery VEC given the substantial overlap with the management areas and past shrimp trawling effort. To the extent that water temperature influences recovery of the shrimp resource, climate-mediated environmental changes could exacerbate negative impacts in this fishery.

The most significant impacts identified (i.e. highly positive or highly negative) would be expected to have the greatest influence on overall cumulative effects within and across VECs. For example, central Gulf of Maine habitat Alternative 3 and Georges Bank habitat Alternative 8 are expected to have highly positive impacts on habitats, and western Gulf of Maine habitat Alternatives 3 and 4 are expected to have highly positive impacts on large mesh groundfish juveniles and their associated habitats. The “no habitat management area”/Alternative 2 measures are expected to have highly negative impacts in some sub-regions, including the central and western Gulf of Maine, and on Georges Bank. Other present and future fishery management

actions could therefore work synergistically with the habitat management alternatives to enhance positive outcomes, or could buffer negative impacts associated with actions taken in this amendment. While non-fishing actions and protected resource management actions could also influence outcomes related to the large-mesh groundfish VEC, fishery management actions in this amendment and outside these amendment are expected to have the greatest influence on the status of large-mesh groundfish.

Again, because direct impacts on protected resources are generally neutral or only slightly negative, the preferred alternatives in this amendment are not expected to have a large influence the overall trends in this VEC (positive for mammals and turtles, more negative for sturgeon and salmon).

3.4 Cumulative effects summary

The direct effects sections in Volume 3 discuss the estimated impacts with respect to the current status of the biological resources and fisheries. In some cases, impacts may be locally negative or positive but insignificant with respect to the resource as a whole. In many cases this is true for the non-large mesh groundfish stocks, especially those managed by the Mid-Atlantic Council, which have limited spatial overlap with the management areas analyzed in this action.

Impacts on the scallop fishery vs. the groundfish resource and fishery are also important to consider relative to their baseline status. Many groundfish resources are overfished, with rebuilding necessary and rebuilding timelines that extend rather far into the future. Alternatives that are expected to have positive biological impacts on these stocks are important, and would hopefully improve the stock status trajectory. On the other hand, economic impacts on the groundfish fishery are often dominated by impacts in higher value fisheries including scallops and clams, such that net economic impact determinations do not always reflect anticipated long-term benefits that may be achieved in the groundfish fishery. Further, while economic impacts to the scallop and clam fisheries may in some cases be locally significant, adverse biological impacts to these stocks are not expected, and even selection of the alternatives with the most negative economic outcomes for these fisheries is not expected to make the economic condition of either fishery poor overall.

4 Compliance with Magnuson-Stevens Fishery Conservation and Management Act

For the DEIS, relevant sections of applicable law are described below. Analysis as to compliance with applicable law will be completed for the FEIS when a proposed action has been identified.

4.1 EFH-related requirements

Mandatory contents of FMPs related to EFH are described in the Magnuson-Stevens Act itself, with detailed guidance provided in the EFH regulations, which can be found at 50 CFR §600.815.

4.1.1 Description and identification of EFH

FMPs must describe and identify EFH in text that clearly states the habitats or habitat types determined to be EFH for each life stage of the managed species.

- FMPs should explain the physical, biological, and chemical characteristics of EFH and, if known, how these characteristics influence the use of EFH by the species/life stage. FMPs must identify the specific geographic location or extent of habitats described as EFH. FMPs must include maps of the geographic locations of EFH or the geographic boundaries within which EFH for each species and life stage is found.
- Pertinent information includes the geographic range and habitat requirements by life stage, the distribution and characteristics of those habitats, and current and historic stock size as it affects occurrence in available habitats. FMPs should summarize the life history information necessary to understand each species' relationship to, or dependence on, its various habitats. FMPs should document patterns of temporal and spatial variation in the distribution of each major life stage to aid in understanding habitat needs. FMPs should summarize all available information on environmental and habitat variables that control or limit distribution, abundance, reproduction, growth, survival, and productivity of the managed species.
- Councils should obtain information to describe and identify EFH from the best available sources, including peer-reviewed literature, unpublished scientific reports, data files of government resource agencies, fisheries landing reports, and other sources of information. Councils should consider different types of information according to its scientific rigor. FMPs should identify species-specific habitat data gaps and deficits in data quality (including considerations of scale and resolution; relevance; and potential biases in collection and interpretation). FMPs must demonstrate that the best scientific information available was used in the description and identification of EFH, consistent with national standard 2.
- The following approach should be used to organize the information necessary to describe and identify EFH. Councils should strive to describe habitat based on the highest level of detail available. FMPs should explain the analyses conducted to distinguish EFH from all habitats potentially used by a species.

- *Level 1: Distribution data are available for some or all portions of the geographic range of the species.* At this level, only distribution data are available to describe the geographic range of a species (or life stage). Distribution data may be derived from systematic presence/absence sampling and/or may include information on species and life stages collected opportunistically. In the event that distribution data are available only for portions of the geographic area occupied by a particular life stage of a species, habitat use can be inferred on the basis of distributions among habitats where the species has been found and on information about its habitat requirements and behavior. Habitat use may also be inferred, if appropriate, based on information on a similar species or another life stage.
- *Level 2: Habitat-related densities of the species are available.* At this level, quantitative data (i.e., density or relative abundance) are available for the habitats occupied by a species or life stage. Because the efficiency of sampling methods is often affected by habitat characteristics, strict quality assurance criteria should be used to ensure that density estimates are comparable among methods and habitats. Density data should reflect habitat utilization, and the degree that a habitat is utilized is assumed to be indicative of habitat value. When assessing habitat value on the basis of fish densities in this manner, temporal changes in habitat availability and utilization should be considered.
- *Level 3: Growth, reproduction, or survival rates within habitats are available.* At this level, data are available on habitat-related growth, reproduction, and/or survival by life stage. The habitats contributing the most to productivity should be those that support the highest growth, reproduction, and survival of the species (or life stage).
- *Level 4: Production rates by habitat are available*. At this level, data are available that directly relate the production rates of a species or life stage to habitat type, quantity, quality, and location. Essential habitats are those necessary to maintain fish production consistent with a sustainable fishery and the managed species' contribution to a healthy ecosystem.

- FMPs must describe EFH in text, including reference to the geographic location or extent of EFH using boundaries such as longitude and latitude, isotherms, isobaths, political boundaries, and major landmarks. If there are differences between the descriptions of EFH in text, maps, and tables, the textual description is ultimately determinative of the limits of EFH. Text and tables should explain pertinent physical, chemical, and biological characteristics of EFH for the managed species and explain any variability in habitat usage patterns, but the boundaries of EFH should be static.
  - If a species is overfished and habitat loss or degradation may be contributing to the species being identified as overfished, all habitats currently used by the species may be considered essential in addition to certain historic habitats that are necessary to support rebuilding the fishery and for which restoration is technologically and economically feasible. Once the fishery is no longer considered overfished, the EFH identification should be reviewed and amended, if appropriate.

    - Areas described as EFH will normally be greater than or equal to aquatic areas that have been identified as ‘‘critical habitat’’ for any managed species listed as threatened or endangered under the Endangered Species Act.
- FMPs must include maps that display, within the constraints of available information, the geographic locations of EFH or the geographic boundaries within which EFH for each species and life stage is found.
    - Where the present distribution or stock size of a species or life stage is different from the historical distribution or stock size, then maps of historical habitat boundaries should be included in the FMP, if known.
    - FMPs should include maps of any habitat areas of particular concern.

4.1.2 Adverse effects determination

Each FMP must contain an evaluation of the potential adverse effects of fishing on EFH designated under the FMP, including effects of each fishing activity regulated under the FMP or other Federal FMPs.

- This evaluation should consider the effects of each fishing activity on each type of habitat found within EFH. FMPs must describe each fishing activity, review and discuss all available relevant information (such as information regarding the intensity, extent, and frequency of any adverse effect on EFH; the type of habitat within EFH that may be affected adversely; and the habitat functions that may be disturbed), and provide conclusions regarding whether and how each fishing activity adversely affects EFH. The evaluation should also consider the cumulative effects of multiple fishing activities on EFH. The evaluation should list any past management actions that minimize potential adverse effects on EFH and describe the benefits of those actions to EFH. The evaluation should give special attention to adverse effects on habitat areas of particular concern (HAPC) and should identify for possible designation as habitat areas of particular concern any EFH that is particularly vulnerable to fishing activities. Additionally, the evaluation should consider the establishment of research closure areas or other measures to evaluate the impacts of fishing activities on EFH. In completing this evaluation, Councils should use the best scientific information available, as well as other appropriate information sources. Councils should consider different types of information according to its scientific rigor.
- Each FMP must minimize to the extent practicable adverse effects from fishing on EFH, including EFH designated under other Federal FMPs. Councils must act to prevent, mitigate, or minimize any adverse effects from fishing, to the extent practicable, if there is evidence that a fishing activity adversely affects EFH in a manner that is more than minimal and not temporary in nature, based on the evaluation conducted pursuant to paragraph (a)(2)(i) of this section and/or the cumulative impacts analysis conducted pursuant to paragraph (a)(5) of this section. In such cases, FMPs should identify a range of potential new actions that could be taken to address adverse effects on EFH, include an

analysis of the practicability of potential new actions, and adopt any new measures that are necessary and practicable. Amendments to the FMP or to its implementing regulations must ensure that the FMP continues to minimize to the extent practicable adverse effects on EFH caused by fishing. FMPs must explain the reasons for the Council's conclusions regarding the past and/or new actions that minimize to the extent practicable the adverse effects of fishing on EFH.

- In determining whether it is practicable to minimize an adverse effect from fishing, Councils should consider the nature and extent of the adverse effect on EFH and the long and short-term costs and benefits of potential management measures to EFH, associated fisheries, and the nation, consistent with national standard 7. In determining whether management measures are practicable, Councils are not required to perform a formal cost/benefit analysis.
- Fishery management options may include, but are not limited to:
    - *Fishing equipment restrictions*. These options may include, but are not limited to: seasonal and areal restrictions on the use of specified equipment, equipment modifications to allow escapement of particular species or particular life stages (e.g., juveniles), prohibitions on the use of explosives and chemicals, prohibitions on anchoring or setting equipment in sensitive areas, and prohibitions on fishing activities that cause significant damage to EFH.
    - *Time/area closures*. These actions may include, but are not limited to: closing areas to all fishing or specific equipment types during spawning, migration, foraging, and nursery activities and designating zones for use as marine protected areas to limit adverse effects of fishing practices on certain vulnerable or rare areas/species/ life stages, such as those areas designated as habitat areas of particular concern.
    - *Harvest limits*. These actions may include, but are not limited to, limits on the take of species that provide structural habitat for other species assemblages or communities and limits on the take of prey species.

4.1.3 Non-MSA fishing activities that may adversely affect EFH

FMPs must identify any fishing activities that are not managed under the Magnuson-Stevens Act that may adversely affect EFH. Such activities may include fishing managed by state agencies or other authorities.

4.1.4 Summary of nonfishing related activities that may adversely affect EFH

FMPs must identify activities other than fishing that may adversely affect EFH. For each activity, the FMP should describe known and potential adverse effects to EFH.

4.1.5 Cumulative impacts analysis

Cumulative impacts are impacts on the environment that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of

who undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. To the extent feasible and practicable, FMPs should analyze how the cumulative impacts of fishing and non-fishing activities influence the function of EFH on an ecosystem or watershed scale. An assessment of the cumulative and synergistic effects of multiple threats, including the effects of natural stresses (such as storm damage or climate-based environmental shifts) and an assessment of the ecological risks resulting from the impact of those threats on EFH, also should be included.

4.1.6 Conservation and enhancement of EFH

FMPs must identify actions to encourage the conservation and enhancement of EFH, including recommended options to avoid, minimize, or compensate for the adverse effects identified pursuant to paragraphs (a)(3) through (5) of this section, especially in habitat areas of particular concern.

4.1.7 Prey species evaluation

Loss of prey may be an adverse effect on EFH and managed species because the presence of prey makes waters and substrate function as feeding habitat, and the definition of EFH includes waters and substrate necessary to fish for feeding. Therefore, actions that reduce the availability of a major prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat that are known to cause a reduction in the population of the prey species, may be considered adverse effects on EFH if such actions reduce the quality of EFH. FMPs should list the major prey species for the species in the fishery management unit and discuss the location of prey species' habitat. Adverse effects on prey species and their habitats may result from fishing and non-fishing activities.

4.1.8 Identification of Habitat Areas of Particular Concern

FMPs should identify specific types or areas of habitat within EFH as habitat areas of particular concern based on one or more of the following considerations: (i) The importance of the ecological function provided by the habitat; (ii) the extent to which the habitat is sensitive to human-induced environmental degradation; (iii) whether, and to what extent, development activities are, or will be, stressing the habitat type; (iv) the rarity of the habitat type.

4.1.9 Research and information needs

Each FMP should contain recommendations, preferably in priority order, for research efforts that the Councils and NMFS view as necessary to improve upon the description and identification of EFH, the identification of threats to EFH from fishing and other activities, and the development of conservation and enhancement measures for EFH.

4.1.10 Review and revision of EFH components of FMPs

Councils and NMFS should periodically review the EFH provisions of FMPs and revise or amend EFH provisions as warranted based on available information. FMPs should outline the procedures the Council will follow to review and update EFH information. The review of information should include, but not be limited to, evaluating published scientific literature and unpublished scientific reports; soliciting information from interested parties; and searching for

previously unavailable or inaccessible data. Councils should report on their review of EFH information as part of the annual Stock Assessment and Fishery Evaluation (SAFE) report prepared pursuant to § 600.315(e). A complete review of all EFH information should be conducted as recommended by the Secretary, but at least once every 5 years.

4.2 National standards

The ten national standards for fishery management plans are as follows:

1. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.
2. Conservation and management measures shall be based upon the best scientific information available.
3. To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.
4. Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.
5. Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.
6. Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.
7. Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.
8. Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2), in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.
9. Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.
10. Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

4.3 Other required provisions

Any fishery management plan which is prepared by any Council, or by the Secretary, with respect to any fishery, shall:

1. Contain the conservation and management measures, applicable to foreign fishing and fishing by vessels of the United States, which are (A) necessary and appropriate for the conservation and management of the fishery to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery; (B) described in this subsection or subsection (b), or both; and (C) consistent with the national standards, the other provisions of this Act, regulations implementing recommendations by international organizations in which the United States participates (including but not limited to closed areas, quotas, and size limits), and any other applicable law;
2. Contain a description of the fishery, including, but not limited to, the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, the cost likely to be incurred in management, actual and potential revenues from the fishery, any recreational interest in the fishery, and the nature and extent of foreign fishing and Indian treaty fishing rights, if any;
3. Assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification;
4. Assess and specify (A) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield specified under paragraph (3), (B) the portion of such optimum yield which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing, and (C) the capacity and extent to which United States fish processors, on an annual basis, will process that portion of such optimum yield that will be harvested by fishing vessels of the United States;
5. Specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, charter fishing, and fish processing in the fishery, including, but not limited to, information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, number of hauls, economic information necessary to meet the requirements of this Act, and the estimated processing capacity of, and the actual processing capacity utilized by, United States fish processors;
6. Consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safe conduct of the fishery; except that the adjustment shall not adversely affect conservation efforts in other fisheries or discriminate among participants in the affected fishery;
7. Describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 305(b)(1)(A), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat;
8. In the case of a fishery management plan that, after January 1, 1991, is submitted to the Secretary for review under section 304(a) (including any plan for which an amendment is submitted to the Secretary for such review) or is prepared by the Secretary, assess and specify the nature and extent of scientific data which is needed for effective implementation of the plan;

9. Include a fishery impact statement for the plan or amendment (in the case of a plan or amendment thereto submitted to or prepared by the Secretary after October 1, 1990) which shall assess, specify, and analyze the likely effects, if any, including the cumulative conservation, economic, and social impacts, of the conservation and management measures on, and possible mitigation measures for (A) participants in the fisheries and fishing communities affected by the plan or amendment; (B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants; and (C) the safety of human life at sea, including whether and to what extent such measures may affect the safety of participants in the fishery;
10. Specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery) and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery;
11. Establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority (A) minimize bycatch; and (B) minimize the mortality of bycatch which cannot be avoided;
12. Assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish, and include conservation and management measures that, to the extent practicable, minimize mortality and ensure the extended survival of such fish;
13. Include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery, including its economic impact, and, to the extent practicable, quantify trends in landings of the managed fishery resource by the commercial, recreational, and charter fishing sectors;
14. To the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, allocate, taking into consideration the economic impact of the harvest restrictions or recovery benefits on the fishery participants in each sector, any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery and;
15. Establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability.

4.4 EFH Assessment

To be completed for the FEIS.

5 Compliance with the National Environmental Policy Act

NEPA provides a mechanism for identifying and evaluating the full spectrum of environmental issues associated with federal actions, and for considering a reasonable range of alternatives to avoid or minimize adverse environmental impacts. This document is designed to meet the requirements of both the Magnuson Stevens Act and NEPA. The Council on Environmental Quality has issued regulations specifying the requirements for NEPA documents (40 CFR 1500 – 1508). All of those requirements are addressed in this document, as referenced below.

This document includes the standard contents of an EIS:

- Cover sheet
- An abstract is provided behind the cover sheet of Volume 1.
- An Executive Summary can be found in Volume 1.
- A table of contents can be found in section Volume 1.
- The need and purpose for this action is described in Volume 1.
- The alternatives that were considered are described in Volume 2 (EFH and HAPC designations) and Volume 3 (habitat, spawning, and research area alternatives, and monitoring alternatives).
- A description of the affected environment is in Volume 1.
- The environmental impacts of the Proposed Action are described in sections Volume 2 and Volume 3; cumulative impacts of the alternatives will be described in Volume 3.
- A list of preparers is in Volume 4, section 5.2.
- References are in Volume 4, section 8.1.
- The EIS distribution list is in Volume 4, section 5.4.
- The index is in Volume 4, section 0.
- The agencies and persons consulted on this action are listed in Volume 4, section 5.3.
- Supporting appendices are provided in Volume 5.

5.1 Scoping process and opportunities for public comment

On February 24, 2004, the Council published in the Federal Register a Notice of Intent (NOI) to prepare this EIS (69 FR 8367). The Council solicited written comments to determine the issues of concern and the appropriate range of management alternatives to be addressed in the EIS and notified the public of five scoping hearings (Table 21). The Council received 13 written comments during the scoping period.

On September 9, 2005, the Council published a NOI to communicate its intent to develop the Omnibus EFH Amendment via a phased approach, separating out the development and review of EFH and HAPC designation alternatives from alternatives intended to minimize the adverse effects of fishing on designated EFH (70 FR 53636). The Council received 2 written comments during the 30 day comment period. A notice of availability for the Phase 1 Draft EIS (DEIS) was published on April 6, 2007 (72 FR 17157). Public hearings were conducted in 2007 to gather feedback on the alternatives proposed in the Phase 1 DEIS (Table 21). The Council received 6 written comments during the 45 day comment period.

On October 5, 2009, the Council published a NOI to indicate that a final EIS for the Phase 1 components would not be published separately, but rather a complete DEIS containing alternatives from both phases would be produced upon completion of Phase 2 (74 FR 51126, correction 74 FR 64049). The Council received 2 written comments during the comment period, which was initially 30 days but extended for another 14 days due to an incorrect email address in the original notice.

On June 17, 2011 the Council published a NOI indicating its intent to consider changes to the Northeast multispecies closed areas in the Omnibus EFH Amendment (76 FR 35408). The Council received 7 written comments during the 30 day comment period.

On July 27, 2012, the Council published a NOI indicating its intent to possibly remove further consideration of alternatives to protect deep-sea corals from the Omnibus EFH Amendment (77 FR 44214). The Council received 2 written comments during the 30 day comment period. These alternatives were removed by the Council into a separate Omnibus action in September 2012.

The amendment was developed and discussed at the following meetings (Table 21). Opportunities for public comment were provided at Advisory Panel, Committee, and Council meetings, and of course during public hearings. There are limited opportunities to comment during technical meetings and conference calls (i.e. Plan Development Team and Closed Area Technical Team). The Council also held three days of informational interviews during August 2013. These were closed sessions by appointment with individuals and small groups. Registration was open to the public but the meetings were targeted towards groundfishermen.

Table 21 – List of public meetings related to the development of Omnibus EFH Amendment 2. PDT = Plan Development Team, CATT = Closed Area Technical Team, AP = Advisory Panel.

2004		
Date	**Meeting type**	**Location**
January 27-29, 2004	Council	Newport, RI
March 5, 2004	Scoping Meeting	Rockland, ME
March 10, 2004	Scoping Meeting	New Bedford, MA
March 15, 2004	Scoping Meeting	Stonington, CT
March 16, 2004	Scoping Meeting	Wrightsville Beach, NC
March 23, 2004	Scoping Meeting	Gloucester, MA
March 23-25, 2004	Council	Gloucester, MA
May 25-26, 2004	PDT	Woods Hole, MA
June 16, 2004	Committee/AP	Portsmouth, NH
July 13-15, 2004	Council	Portland, ME
September 8, 2004	Committee	Braintree, MA
September 14-16, 2004	Council	Fairhaven, MA
2005		
Date	**Meeting type**	**Location**
January 10-12, 2005	Scientific Workshop	Mystic, CT
February 1-3, 2005	Council	Portsmouth, NH

April 13, 2005	PDT/AP	Narragansett, RI
May 26, 2005	Committee	Narragansett, RI
June 21-23, 2005	Council	Portland, ME
August 22, 2005	Committee	Portland, ME
September 13-15, 2005	Council	Hyannis, MA
September 27, 2005	PDT	Woods Hole, MA
October 18, 2005	PDT	Mansfield, MA
October 27, 2005	PDT	Woods Hole, MA
November 14, 2005	Committee	Mansfield, MA
November 15-17, 2005	Council	Hyannis, MA
December 1, 2005	PDT	Newburyport, MA
December 14-15, 2005	PDT	Woods Hole, MA
2006		
Date	**Meeting type**	**Location**
January 11, 2006	Committee	Mystic, CT
January 25, 2006	PDT	Woods Hole, MA
January 31 – Feb 2, 2006	Council	Portland, ME
March 13-14, 2006	PDT	Woods Hole, MA
March 7, 2006	AP	Plymouth, MA
March 20, 2006	Committee	Plymouth, MA
April 4-5, 2006	Council	Mystic, CT
April 18, 2006	PDT	Woods Hole, MA
May 17-18, 2006	PDT	Woods Hole, MA
May 8, 2006	AP	Portsmouth, NH
June 6-7, 2006	Committee	Mansfield, MA
June 13-15, 2006	Council	Newport, RI
July 26, 2006	PDT	Woods Hole, MA
August 15, 2006	AP	Danvers, MA
September 7, 2006	Committee	Fairhaven, MA
September 26, 2006	Council	Peabody, MA
October 3, 2006	PDT	Woods Hole, MA
October 11, 2006	Council (MAFMC)	Kitty Hawk, NC
November 14, 2006	Committee	Gloucester, MA
November 14-16, 2006	Council	Gloucester, MA
December 12-14, 2006	Council (MAFMC)	New York, NY
2007		
Date	**Meeting type**	**Location**
January 16, 2007	Committee	Providence, RI
February 6-8, 2007	Council	Portsmouth, NH
April 10-12, 2007	Council	Mystic, CT
April 11, 2007	Public hearing	Mystic, CT
April 18, 2007	Public hearing	Ocean City, MD
May 31, 2007	PDT	Woods Hole, MA
June 5, 2007	AP, then Committee	Mystic, CT

June 19-21, 2007	Council	Portland, ME
August 15, 2007	PDT	Narragansett, RI
September 17, 2007	Committee	Plymouth, MA
September 18-19, 2007	Council	Plymouth, MA
November 6, 2007	PDT	Newport, RI
December 10, 2007	PDT	Plymouth, MA
2008		
Date	**Meeting type**	**Location**
January 27, 2008	PDT	call
February 4, 2008	Committee	Mansfield, MA
February 12-14, 2008	Council	Portsmouth, NH
March 3, 2008	PDT	Narragansett, RI
May 8, 2008	PDT	call
May 16, 2008	Committee	Mansfield, MA
June 3-5, 2008	Council	Portland, ME
June 11, 2008	PDT	call
July 10, 2008	Committee	Mansfield, MA
July 24, 2008	PDT	Portland, ME
September 30, 2008	PDT	call
October 2, 2008	Committee	Plymouth, MA
November 3, 2008	PDT	Gloucester, MA
November 4, 2008	PDT	Gloucester, MA
November 10, 2008	PDT	call
November 14, 2008	Committee	Mansfield, MA
November 18-20, 2008	Council	Danvers, MA
December 1, 2008	PDT	call
2009		
Date	**Meeting type**	**Location**
January 7, 2009	PDT	Woods Hole, MA
January 8, 2009	PDT	Woods Hole, MA
February 11, 2009	PDT	Portsmouth, NH
February 13, 2009	PDT	call
March 26, 2009	PDT	Plymouth, MA
March 18, 2009	SSC	Boston, MA
March 27, 2009	PDT	Plymouth, MA
May 28, 2009	PDT	Woods Hole, MA
May 29, 2009	PDT	Woods Hole, MA
June 22-25, 2009	Council	Portland, ME
August 31, 2009	PDT	Boston, MA
September 1, 2009	PDT	Boston, MA
October 28, 2009	PDT	call
November 17, 2009	PDT	Newport, RI
December 9, 2009	SSC	Boston, MA

2010		
Date	**Meeting type**	**Location**
January 26-28, 2010	Council	Portsmouth, NH
February 22, 2010	PDT	Boston, MA
February 23, 2010	PDT	Boston, MA
April 27-29, 2010	Council	Mystic, CT
June 7, 2010	PDT	Newburyport, MA
June 8, 2010	PDT	Newburyport, MA
June 10, 2010	Committee	in person
June 22-24, 2010	Council	Portland, ME
July 26, 2010	PDT	Boston, MA
July 27, 2010	PDT	Boston, MA
August 25, 2010	SSC	Boston, MA
September 16, 2010	PDT	Boston, MA
September 27, 2010	Committee	in person
October 28, 2010	Committee	in person
2011		
Date	**Meeting type**	**Location**
January 6, 2011	Committee	East Boston, MA
January 25-27, 2011	Council	Portsmouth, NH
February 15, 2011	Ad-hoc SASI review panel	Providence, RI
March 10, 2011	Committee	Portsmouth, NH
April 26-28, 2011	Council	Mystic, CT
June 8, 2011	PDT	Boston, MA
June 9, 2011	PDT	Boston, MA
June 21-23, 2011	Council	Portland, ME
July 21, 2011	Committee	Mansfield, MA
August 15, 2011	PDT	Boston, MA
August 30, 2011	Committee	Portsmouth, NH
October 17, 2011	PDT	Woods Hole, MA
October 18, 2011	PDT	Woods Hole, MA
October 25, 2011	PDT	call
December 7, 2011	PDT	Boston, MA
2012		
Date	**Meeting type**	**Location**
January 4, 2012	PDT	call
January 12, 2012	PDT	call
January 31-February 2, 2012	Council	Portsmouth, NH
February 7, 2012	PDT	Boston, MA
February 23, 2012	Committee	Portsmouth, NH
March 7, 2012	PDT	Boston, MA
April 6, 2012	Committee	Providence, RI
April 24-26, 2012	Council	Mystic, CT
June 6, 2012	PDT	Boston, MA

June 8, 2012	Committee	Portland, ME
June 19-21, 2012	Council	Portland, ME
August 9, 2012	PDT	Boston, MA
August 23, 2012	Committee	Providence, RI
September 4, 2012	CATT	call
September 12, 2012	CATT	Braintree, MA
September 25-27, 2012	Council	Plymouth, MA
October 1, 2012	Groundfish PDT	call
October 10, 2012	PDT, AP	Hampton, NH
October 11, 2012	Groundfish Committee	Hampton, NH
October 12, 2012	CATT	Mansfield, MA
October 29, 2012	CATT	Braintree, MA
November 2, 2012	PDT	call
December 4, 2012	Committee	New Bedford, MA
December 12, 2012	CATT	Braintree, MA
2013		
Date	**Meeting type**	**Location**
January 9, 2013	CATT	Braintree, MA
January 10, 2013	CATT	Braintree, MA
January 15, 2013	PDT	call
January 17, 2013	PDT and CATT	Milford, MA
January 18, 2013	CATT	Milford, MA
January 24, 2013	Groundfish Committee and Groundfish AP	
January 29-31, 2013	Council	Portsmouth, NH
February 15, 2013	CATT	Braintree, MA
March 6, 2013	PDT	Boston, MA
March 7, 2013	CATT	Braintree, MA
March 19, 2013	Committee	Salem, MA
March 28, 2013	CATT	Braintree, MA
April 17, 2013	Groundfish Committee	Mansfield, MA
April 23-25, 2013	Council	Mystic, CT
April 29, 2013	PDT and CATT	Mansfield, MA

May 6, 2013	PDT	call
May 10, 2013	PDT and CATT	Rockland, MA
May 16, 2013	SSC	Mansfield, MA
May 17, 2013	Committee (Habitat and Groundfish)	Portsmouth, NH
May 29, 2013	PDT and CATT	Rockland, MA
May 30, 2013	PDT and CATT	Rockland, MA
June 11, 2013	Committee (Habitat and Groundfish)	Providence, RI
June 18-20, 2013	Council	Portland, ME
August 19, 2013	PDT and CATT	Rockland, MA
September 5, 2013	Committee (Habitat and Groundfish)	Portsmouth, NH
September 18, 2013	CATT	Taunton, MA
September 19, 2013	PDT	Taunton, MA
September 24-26, 2013	Council	Hyannis, MA
October-November 2013	CATT-PDT	5 conference calls
December 3, 2013	CATT-PDT	Rockland, MA
December 20, 2013	Council	Danvers, MA
January 28, 2014	Council	Portsmouth, NH
February 19, 2014	Groundfish Recreational Advisory Panel	Danvers, MA
February 25-26, 2014	Council	Danvers, MA

5.2 List of preparers

This document was prepared primarily by members of the New England Fishery Management Council staff, Habitat Plan Development Team, and Closed Area Technical Team. There have been numerous personnel changes over time due to the lengthy development of this action.

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Additional current and former NEFMC staff who contributed written materials, or were consulted during preparation of this document, included Deirdre Boelke, Lori Steele, Jaime Cournane, Philip Haring, Talia Bigelow, Anne Hawkins, Demet Haksever, Lou Goodreau, Patricia Fiorelli, Rachel Feeney, Rachel Neild, Thomas Nies, and Christopher Kellogg. Administrative support, including compilation of the administrative record, was provided by Woneta Cloutier, Joan O'Leary, and Karen Roy.

5.3 Agencies and persons consulted

The following agencies were consulted during the development of this amendment:

- New England Fishery Management Council, which includes representatives from the following additional organizations:
    - Connecticut Department of Environmental Protection
    - Rhode Island Department of Environmental Management
    - Massachusetts Division of Marine Fisheries
    - New Hampshire Fish and Game
    - Maine Department of Marine Resources
- Mid-Atlantic Fishery Management Council
- National Marine Fisheries Service, NOAA, Department of Commerce
- United States Coast Guard, Department of Homeland Security

5.4 Document circulation list

This section will be completed for the FEIS.

5.5 Summary of public comments

A summary of comments from the public hearings and concurrent public comment period will be included in the FEIS.

5.6 Response to public comments

This section will be completed for the FEIS.

6 Relationship to other applicable law

Analysis as to compliance with applicable law will be completed for the FEIS when a proposed action has been identified.

6.1 Marine Mammal Protection Act (MMPA)

6.2 Endangered Species Act (ESA)

6.3 Administrative Procedure Act (APA)

6.4 Paperwork Reduction Act (PRA)

6.5 Coastal Zone Management Act (CZMA)

6.6 Data Quality Act

6.7 Regulatory Flexibility Act

6.8 Executive Order 12866 (Planning and Coordination)

6.9 Executive Order 12898 (Environmental Justice)

6.10 Executive Order 13132 (Federalism)

6.11 Executive order 13158 (Marine Protected Areas)

7 Index

8 References

8.1 Glossary

A: Refers to the area swept by a piece of fishing gear, adjusted for contact of gear with the seabed (contact index). *A* is added to the SASI model in annual time steps.

Adverse effect: An impact to EFH that is 'more than minimal and not temporary in nature' Any impact that reduces quality and/or quantity of EFH. May include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include sites-specific of habitat wide impacts, including individual, cumulative, or synergistic consequences of actions.

Adult stage: One of several marked phases or periods in the development and growth of many animals. In vertebrates, the life history stage where the animal is capable of reproducing, as opposed to the juvenile stage.

Aggregation: A group of animals or plants occurring together in a particular location or region.

Amendment: a formal change to a fishery management plan (FMP). The Council prepares amendments and submits them to the Secretary of Commerce for review and approval. The Council may also change FMPs through a "framework adjustment procedure" (see below). The Commission prepares amendments and submits them to the Commission's Atlantic Herring Section for approval. Implementing regulations are adopted by the states.

Amphipods: A small crustacean of the order Amphipoda, such as the beach flea, having a laterally compressed body with no carapace.

Anadromous species: fish that spawn in fresh or estuarine waters and migrate to ocean waters

Anemones: Any of numerous flowerlike marine coelenterates of the class Anthozoa, having a flexible cylindrical body and tentacles surrounding a central mouth.

Bay: An inlet of the sea or other body of water usually smaller than a gulf; a small body of water set off from the main body; e.g. Ipswich Bay in the Gulf of Maine.

Benthic community: Benthic means the bottom habitat of the ocean, and can mean anything as shallow as a salt marsh or the intertidal zone, to areas of the bottom that are several miles deep in the ocean. Benthic community refers to those organisms that live in and on the bottom.

Biological feature: Any living seabed structure assumed to be used for shelter by managed species of fish or their prey

Biota: all the plant and animal life of a particular region.

Benthic community: *Benthic* means the bottom habitat of the ocean, and can mean anything as shallow as a salt marsh or the intertidal zone, to areas of the bottom that are several miles deep in the ocean. *Benthic community* refers to those organisms that live in and on the bottom. (*In* meaning they live within the substrate; e.g, within the sand or mud found on the bottom. See *Benthic infauna*, below)

Benthic infauna: See *Benthic community*, above. Those organisms that live *in* the bottom sediments (sand, mud, gravel, etc.) of the ocean. As opposed to *benthic epifauna*, that live *on* the surface of the bottom sediments.

Benthivore: Usually refers to fish that feed on benthic or bottom dwelling organisms.

Berm: A narrow ledge typically at the top or bottom of a slope; e.g. a berm paralleling the shoreline caused by wave action on a sloping beach; also an elongated mound or wall of earth.

Biogenic habitats: Ocean habitats whose physical structure is created or produced by the animals themselves; e.g, coral reefs.

Biomass: The total mass of living matter in a given unit area or the weight of a fish stock or portion thereof. Biomass can be listed for beginning of year (Jan-1), Mid-Year, or mean (average during the entire year). In addition, biomass can be listed by age group (numbers at age * average weight at age) or summarized by groupings (e.g., age 1^+, ages 4+ 5, etc). See also spawning stock biomass, exploitable biomass, and mean biomass.

B_{MSY}: The stock biomass that would produce MSY when fished at a fishing mortality rate equal to F_{MSY}. For most stocks, B_{MSY} is about ½ of the carrying capacity. The proposed overfishing definition control rules call for action when biomass is below ¼ or ½ B_{MSY}, depending on the species.

$B_{threshold}$: 1) A limit reference point for biomass that defines an unacceptably low biomass i.e., puts a stock at high risk (recruitment failure, depensation, collapse, reduced long term yields, etc). 2) A biomass threshold that the SFA requires for defining when a stock is overfished. A stock is overfished if its biomass is below $B_{threshold}$. A determination of overfished triggers the SFA requirement for a rebuilding plan to achieve B_{target} as soon as possible, usually not to exceed 10 years except certain requirements are met. In Amendment 9 control rules, $B_{threshold}$ is often defined as either $1/2B_{MSY}$ or $1/4\ B_{MSY}$. $B_{threshold}$ is also known as $B_{minimum}$.

B_{target}: A desirable biomass to maintain fishery stocks. This is usually synonymous with B_{MSY} or its proxy.

Biomass weighted F: A measure of fishing mortality that is defined as an average of fishing mortality at age weighted by biomass at age for a ranges of ages within the stock (e.g., ages 1^+ biomass weighted F is a weighted average of the mortality for ages 1 and older, age 3^+ biomass weighted is a weighted average for ages 3 and older). Biomass weighted F can also be calculated using catch in weight over mean biomass. See also fully-recruited F.

Biota: All the plant and animal life of a particular region.

Bivalve: A class of mollusks having a soft body with platelike gills enclosed within two shells hinged together; e.g., clams, mussels.

Bottom roughness: The inequalities, ridges, or projections on the surface of the seabed that are caused by the presence of bedforms, sedimentary structures, sedimentary particles, excavations, attached and unattached organisms, or other objects; generally small scale features.

Bottom tending mobile gear: All fishing gear that operates on or near the ocean bottom that is actively worked in order to capture fish or other marine species. Some examples of bottom tending mobile gear are otter trawls and dredges.

Bottom tending fixed gear: All fishing gear that operates on or near the ocean bottom that I snot actively worked; instead, the effectiveness of this gear depends on species moving to the gear which is set in a particular manner by a vessel, and later retrieved. Some examples of bottom tending static gear are gillnets, traps, and pots.

Boulder reef: An elongated feature (a chain) of rocks (generally piled boulders) on the seabed.

Bryozoans: Phylum aquatic organisms, living for the most part in colonies of interconnected individuals. A few to many millions of these individuals may form one colony. Some bryozoans encrust rocky surfaces, shells, or algae others form lacy or fan-like colonies that in some regions may form an abundant component of limestones. Bryozoan colonies range from millimeters to meters in size, but the individuals that make up the colonies are rarely larger than a millimeter. Colonies may be mistaken for hydroids, corals or seaweed.

Burrow: A hole or excavation in the sea floor made by an animal (as a crab, lobster, fish, burrowing anemone) for shelter and habitation.

Bycatch: (v.) the capture of nontarget species in directed fisheries which occurs because fishing gear and methods are not selective enough to catch only target species; (n.) fish which are harvested in a fishery but are not sold or kept for personal use, including economic discards and regulatory discards but not fish released alive under a recreational catch and release fishery management program.

Continental shelf waters: waters overlying the continental shelf, which extends seaward from the shoreline and deepens gradually to the point where the sea floor begins a slightly steeper descent to the deep ocean floor; the depth of the shelf edge varies, but is approximately 200 meters in many regions.

Crustaceans: invertebrates characterized by a hard outer shell and jointed appendages and bodies. They usually live in water and breathe through gills. Higher forms of this class include lobsters, shrimp and crawfish; lower forms include barnacles.

Capacity: the level of output a fishing fleet is able to produce given specified conditions and constraints. Maximum fishing capacity results when all fishing capital is applied over the maximum amount of available (or permitted) fishing time, assuming that all variable inputs are utilized efficiently.

Catch: the sum total of fish killed in a fishery in a given period. Catch is given in either weight or number of fish and may include landings, unreported landings, discards (bycatch), and incidental deaths.

Contact index: The proportion of a gear component that is assumed to touch the seabed during fishing

Coarse sediment: Sediment generally of the sand and gravel classes; not sediment composed primarily of mud; but the meaning depends on the context, e.g. within the mud class, silt is coarser than clay.

Commensalism: See *Mutualism*. An interactive association of two species where one benefits in some way, while the other species is in no way affected by the association.

Continental shelf waters: The waters overlying the continental shelf, which extends seaward from the shoreline and deepens gradually to the point where the sea floor begins a slightly steeper descent to the deep ocean floor; the depth of the shelf edge varies, but is approximately 200 meters in many regions.

Control rule: A pre-determined method for determining fishing mortality rates based on the relationship of current stock biomass to a biomass target. Amendment 9 overfishing control rules define a target biomass (B_{MSY} or proxy) as a management objective. The biomass threshold ($B_{threshold}$ or B_{min}) defines a minimum biomass below which a stock is considered overfished.

Cohort: see yearclass.

Crustaceans: Invertebrates characterized by a hard outer shell and jointed appendages and bodies. They usually live in water and breathe through gills. Higher forms of this class include lobsters, shrimp and crawfish; lower forms include barnacles.

Data Poor Working Group (DPWG): A standing assessment panel assembled to address stocks with limited or poor data..

Days-at-sea (DAS): the total days, including steaming time that a boat spends at sea to fish. Amendment 13 categorized DAS for the multispecies fishery into three categories, based on each individual vessel's fishing history during the period fishing year 1996 through 2001. The three categories are: Category A: can be used to target any groundfish stock; Category B: can only be used to target healthy stocks; Category C: cannot be used until some point in the future. Category B DAS are further divided equally into Category B (regular) and Category B (reserve).

Demersal species: Most often refers to fish that live on or near the ocean bottom. They are often called benthic fish, groundfish, or bottom fish.

Discards: animals returned to sea after being caught; see Bycatch

Echinoderms: A member of the Phylum Echinodermata. Marine animals usually characterized by a five-fold symmetry, and possessing an internal skeleton of calcite plates, and a complex water vascular system. Includes echinoids (sea urchins), crinoids (sea lillies) and asteroids (starfish).

Egg stage: One of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that occurs after reproduction and refers to the developing embryo, its food store, and sometimes jelly or albumen, all surrounded by an outer shell or membrane. Occurs before the *larval* or *juvenile stage*.

Embayment: A bay or an indentation in a coastline resembling a bay.

Environmental Impact Statement (EIS): an analysis of the expected impacts of a fishery management plan (or some other Proposed Action) on the environment and on people, initially prepared as a "Draft" (DEIS) for public comment. After an initial EIS is prepared for a plan, subsequent analyses are called "Supplemental" (i.e., DSEIS, FSEIS).

Epifauna: Animals that live on the surface of the substrate, and are often associated with surface structures such as rocks, shells, vegetation, or colonies of other animals.

Exclusive Economic Zone (EEZ): for the purposes of the Magnuson-Stevens Fishery Conservation and Management Act, the area from the seaward boundary of each of the coastal states to 200 nautical miles from the baseline.

Essential Fish Habitat (EFH): Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

Estuarine area: The area of an estuary and its margins; an area characterized by environments resulting from the mixing of river and sea water.

Estuary: A water passage where the tide meets a river current; especially an arm of the sea at the lower end of a river; characterized by an environment where the mixing of river and seawater causes marked variations in salinity and temperature in a relatively small area.

Eutrophication: A set of physical, chemical, and biological changes brought about when excessive nutrients are released into the water.

Euphotic zone: The zone in the water column where at least 1% of the incident light at the surface penetrates.

Exclusive Economic Zone (EEZ): a zone in which the inner boundary is a line coterminous with the seaward boundary of each of the coastal States and the outer boundary is line 200 miles away and parallel to the inner boundary

Exempt fisheries: Any fishery determined by the Regional Director to have less than 5 percent regulated species as a bycatch (by weight) of total catch according to 50 CFR 648.80(a)(7).

Exploitable biomass: The biomass of fish in the portion of the population that is vulnerable to fishing.

Fathom: A measure of length, containing six feet; the space to which a man can extend his arms; used chiefly in measuring cables, cordage, and the depth of navigable water by soundings.

FMP (fishery management plan): also referred to as a "plan," this is a document that describes a fishery and establishes measures to manage it. The New England Fishery Management Council prepares FMPs and submits them to the Secretary of Commerce for approval and implementation. The Atlantic States Marine Fisheries Commission prepares FMPs and implementing regulations are adopted by the States.

Fishing mortality (F): A measurement of the rate of removal of fish from a population caused by fishing. This is usually expressed as an instantaneous rate (F) and is the rate at which fish are harvested at any given point in a year. Instantaneous fishing mortality rates can be either fully recruited or biomass weighted. Fishing mortality can also be expressed as an exploitation rate (see exploitation rate) or less commonly, as a conditional rate of fishing mortality (m, fraction of fish removed during the year if no other competing sources of mortality occurred. Lower case m should not be confused with upper case M, the instantaneous rate of natural mortality).

Fishing effort: the amount of time and fishing power used to harvest fish. Fishing power is a function of gear size, boat size and horsepower.

Framework adjustments: adjustments within a range of measures previously specified in a fishery management plan (FMP). A change usually can be made more quickly and easily by a framework adjustment than through an amendment. For plans developed by the New England Council, the procedure requires at least two Council meetings including at least one public hearing and an evaluation of environmental impacts not already analyzed as part of the FMP.

GARM: Groundfish Assessment Review Meeting; peer reviewed assessment of groundfish stock managed by the Northeast Multispecies Fishery Management Plan.

Geological feature: Any non-living seabed structure assumed to be used for shelter by managed species of fish or their prey

Glacial moraine: A sedimentary feature deposited from glacial ice; characteristically composed of unsorted clay, sand, and gravel. Moraines typically are hummocky or ridge-shaped and are located along the sides and at the fronts of glaciers.

Glacial till: Unsorted sediment (clay, sand, and gravel mixtures) deposited from glacial ice.

Grain size: the size of individual sediment particles that form a sediment deposit; particles are separated into size classes (e.g. very fine sand, fine sand, medium sand, among others); the classes are combined into broader categories of mud, sand, and gravel; a sediment deposit can be composed of few to many different grain sizes.

Habitat complexity: Describes or measures a habitat in terms of the variability of its characteristics and its functions, which can be biological, geological, or physical in nature. Refers to how complex the physical structure of the habitat is. A bottom habitat with *structure-forming organisms*, along with other three dimensional objects such as boulders, is more complex than a flat, featureless, bottom.

Highly migratory species: tuna species, marlin, oceanic sharks, sailfishes, and swordfish

Hydroids: Generally, animals of the Phylum Cnidaria, Class Hydrozoa; most hydroids are bush-like polyps growing on the bottom and feed on plankton, they reproduce asexually and sexually.

Individual Fishing Quota (IFQ): federal permit under a limited access system to harvest a quantity of fish, expressed by a unit or units representing a percentage of the total allowable catch of a fishery that may be received or held for exclusive use by an individual person or entity

Juvenile stage: One of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that comes between the *egg* or *larval stage* and the *adult stage*; juveniles are considered immature in the sense that they are not yet capable of reproducing, yet they differ from the larval stage because they look like smaller versions of the adults.

Landings: The portion of the catch that is harvested for personal use or sold.

Larvae stage: One of several marked phases or periods in the development and growth of many animals. The first stage of development after hatching from the *egg* for many fish and invertebrates. This life stage looks fundamentally different than the juvenile and adult stages, and is incapable of reproduction; it must undergo metamorphosis into the juvenile or adult shape or form.

Limited-access permits: permits issued to vessels that met certain qualification criteria by a specified date (the "control date").

Maturity ogive: A mathematical model used to describe the proportion mature at age for the entire population. A_{50} is the age where 50% of the fish are mature.

Meter: A measure of length, equal to 39.37 English inches, the standard of linear measure in the metric system of weights and measures. It was intended to be, and is very nearly, the ten millionth part of the distance from the equator to the north pole, as ascertained by actual measurement of an arc of a meridian.

Metric ton: A unit of weight equal to a thousand kilograms (1kgs = 2.2 lbs.). A metric ton is equivalent to 2,205 lbs. A thousand metric tons is equivalent to 2.2 million lbs.

Molluscs: Common term for animals of the phylum Mollusca. Includes groups such as the bivalves (mussels, oysters etc.), cephalopods (squid, octopus etc.) and gastropods (abalone, snails). Over 80,000 species in total with fossils back to the Cambrian period.

Multispecies: the group of species managed under the Northeast Multispecies Fishery Management Plan. This group includes whiting, red hake and ocean pout plus the regulated species (cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish).

Natural disturbance: A change caused by natural processes; e.g. in the case of the seabed, changes can be caused by the removal or deposition of sediment by currents; such natural processes can be common or rare at a particular site.

Natural mortality: A measurement of the rate of death from all causes other than fishing such as predation, disease, starvation, and pollution. Commonly expressed as an instantaneous rate (M). The rate of natural mortality varies from species to species, but is assumed to be M=0.2 for the five critical stocks. The natural mortality rate can also be expressed as a conditional rate (termed n and not additive with competing sources of mortality such as fishing) or as annual expectation of natural death (termed v and additive with other annual expectations of death).

Northeast Shelf Ecosystem: The Northeast U.S. Shelf Ecosystem has been described as including the area from the Gulf of Maine south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream.

Observer: any person required or authorized to be carried on a vessel for conservation and management purposes by regulations or permits under the Magnuson-Stevens Act

Open access: describes a fishery or permit for which there is no qualification criteria to participate. Open-access permits may be issued with restrictions on fishing (for example, the type of gear that may be used or the amount of fish that may be caught).

Opportunistic species: Species that colonize disturbed or polluted sediments. These species are often small, grow rapidly, have short life spans, and produce many offspring.

Optimum Yield (OY): the amount of fish which A) will provide the greatest overall benefit to the nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery

Overfished: A conditioned defined when stock biomass is below minimum biomass threshold and the probability of successful spawning production is low.

Overfishing: A level or rate of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce MSY on a continuing basis.

Pelagic gear: Mobile or static fishing gear that is not fixed, and is used within the water column, not on the ocean bottom. Some examples are mid-water trawls and pelagic longlines.

Phytoplankton: Microscopic marine plants (mostly algae and diatoms) which are responsible for most of the photosynthetic activity in the oceans.

Polychaetes: Polychaetes are segmented worms in the phylum Annelida. Polychaetes (poly-chaetae = many-setae) differ from other annelids in having many setae (small bristles held in tight bundles) on each segment.

Pre-recruits: Fish in size or age groups that are not vulnerable to the fishery (including discards).

Prey availability: The availability or accessibility of prey (food) to a predator. Important for growth and survival.

Primary production: The synthesis of organic materials from inorganic substances by photosynthesis.

Plan Development Team (PDT): a group of technical experts responsible for developing and analyzing management measures under the direction of the Council.

Prey feature: One of six benthic invertebrate taxa commonly consumed by managed species in the Northeast Region

Recruitment: the amount of fish added to the fishery each year due to growth and/or migration into the fishing area. For example, the number of fish that grow to become vulnerable to fishing gear in one year would be the recruitment to the fishery. “Recruitment” also refers to new year classes entering the population (prior to recruiting to the fishery).

Recruitment overfishing: fishing at an exploitation rate that reduces the population biomass to a point where recruitment is substantially reduced.

Regulated groundfish species: cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish. These species are usually targeted with large-mesh net gear.

Realized: Refers to an area swept data layer that is intended to realistically represent actual fishing effort, where gear dimensions, fishing locations, and number of trips/tows/sets are based

on observer, trip report, or other data sources. Realized area swept is aggregated on an annual basis.

Recovery, R: Recovery is defined as the time in years that would be required for the functional value of that habitat feature to be restored.

SASI model: The combination of vulnerability assessment and geo-referenced fishing effort and habitat data used to estimate the magnitude and location of the adverse effects of fishing on habitat

Simulated: Refers to an area swept data layer that is intended to allow for spatial visualization the underlying seabed vulnerability, independent of the magnitude of area swept. Simulated area swept might be uniformly distributed, or non-uniformly distributed.

Substrate classes: Mud, sand, granule-pebble, cobble, and boulder, as defined by the Wentworth particle grade scale

Susceptibility, S: Susceptibility is defined as the percentage of total habitat features encountered by fishing gear during a hypothetical single pass fishing event that have their functional value reduced.

Structured grid: A regular grid of consisting of 100 km^2 cells to which area swept estimates are inferred.

Sea whips: A coral that forms long flexible structures with few or no branches and is common on Atlantic reefs.

Sea pens: An animal related to corals and sea anemones with a featherlike form.

Sediment: Material deposited by water, wind, or glaciers.

Sediment suspension: The process by which sediments are suspended in water as a result of disturbance.

Sedimentary bedforms: Wave-like structures of sediment characterized by crests and troughs that are formed on the seabed or land surface by the erosion, transport, and deposition of particles by water and wind currents; e.g. ripples, dunes.

Sedimentary structures: Structures of sediment formed on the seabed or land surface by the erosion, transport, and deposition of particles by water and wind currents; e.g. ripples, dunes, buildups around boulders, among others.

Sediment types: Major combinations of sediment grain sizes that form a sediment deposit, e.g. mud, sand, gravel, sandy gravel, muddy sand, among others.

Spawning adult stage: See *adult stage*. Adults that are currently producing or depositing eggs.

Spawning stock biomass (SSB): the total weight of fish in a stock that sexually mature, i.e., are old enough to reproduce.

Species assemblage: Several species occurring together in a particular location or region

Species composition: A term relating the relative abundance of one species to another using a common measurement; the proportion (percentage) of various species in relation to the total on a given area.

Species diversity: The number of different species in an area and their relative abundance

Species richness: See *Species diversity*. A measurement or expression of the number of species present in an area; the more species present, the higher the degree of species richness.

Status Determination: A determination of stock status relative to $B_{threshold}$ (defines overfished) and $F_{threshold}$ (defines overfishing). A determination of either overfished or overfishing triggers a SFA requirement for rebuilding plan (overfished), ending overfishing (overfishing) or both.

Stock: A grouping of fish usually based on genetic relationship, geographic distribution and movement patterns. A region may have more than one stock of a species (for example, Gulf of Maine cod and Georges Bank cod). A species, subspecies, geographical grouping, or other category of fish capable of management as a unit.

Stock assessment: determining the number (abundance/biomass) and status (life-history characteristics, including age distribution, natural mortality rate, age at maturity, fecundity as a function of age) of individuals in a stock

Structure-forming organisms: Organisms, such as corals, colonial bryozoans, hydroids, sponges, mussel beds, oyster beds, and seagrass that by their presence create a three-dimensional physical structure on the bottom. See *biogenic habitats*.

Surficial sediment: Sediment forming the sea floor or land surface; thickness of the surficial layer may vary.

Ten-minute- "squares" of latitude and longitude (TMS): Are a measure of geographic space. The actual size of a ten-minute-square varies depending on where it is on the surface of the earth, but in general each square is approximately 70-80 square nautical miles in this region. This is the spatial area that EFH designations, biomass data, and some of the effort data have been binned into for analysis purposes in various sections of this document.

Topography: The depiction of the shape and elevation of land and sea floor surfaces.

Total Allowable Catch (TAC): The amount (in metric tons) of a stock that is permitted to be caught during a fishing year. In the Multispecies FMP, TACs can either be "hard" (fishing ceases

when the TAC is caught) or a "target" (the TAC is merely used as an indicator to monitor effectiveness of management measures, but does not trigger a closure of the fishery).

Unstructured grid: An irregular grid based on the distribution of substrate data points. High or low energy and a suite of features are inferred to each unstructured grid cell

Vulnerability: The combination of a feature's susceptibility to fishing gear impact and its ability to recover from fishing gear impact

Voronoi tessellation: A mathematical procedure used to develop the unstructured substrate grid based on point data

Valued Ecosystem Component: A resource or environmental feature that is important (not only economically) to a local human population, or has a national or international profile, or if altered from its existing status, will be important for the evaluation of environmental impacts of industrial developments, and the focusing of administrative efforts.

Wentworth: A size-based sediment classification scheme

Yield-per-recruit (YPR): the expected yield (weight) of individual fish calculated for a given fishing mortality rate and exploitation pattern and incorporating the growth characteristics and natural mortality.

Yearclass: also called cohort. Fish that were spawned in the same year. By convention, the "birth date" is set to January 1st and a fish must experience a summer before turning 1. For example, winter flounder that were spawned in February-April 1997 are all part of the 1997 cohort (or year-class). They would be considered age 0 in 1997, age 1 in 1998, etc. A summer flounder spawned in October 1997 would have its birth date set to the following January 1 and would be considered age 0 in 1998, age 1 in 1999, etc.

Zooplankton: Small, often microscopic animals that drift in currents. They feed on detritus, phytoplankton, and other zooplankton. They are preyed upon by fish, shellfish, whales, and other zooplankton.

***Z*:** A measure of the adverse effect of fishing effort on seabed habitat features, measured in km^2 units. Z is area swept (A) that has been adjusted for susceptibility (S) and recovery (R). Z is considered a "stock" effect that accumulates over time based on the amount of adverse effect entering the fishery in any particular time step (Y), and the amount of adverse effect deemed to have recovered in that time step (X), such that $Z = X – Y$.

***Z_∞*:** (Vulnerability) The asymptotically stable equilibrium level of Z. Z_∞ is reached when a constant annual level of fishing area swept is applied to the all grid cells in the model for a length of time just slightly greater than the greatest terminal year of recovery estimated for all features in the Vulnerability Assessment.

$Z_{realized}$: The actual distribution of Z by gear type based on past area swept estimates. Annual $Z_{realized}$ estimates for each 100 km^2 grid cell include the current year Z summed across all area swept in the cell, adjusted for feature susceptibility, plus *Z* accumulated from fishing events in past years that has not yet decayed.

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